

# THE AMERICAN JOURNAL OF PHARMACY.

NOVEMBER, 1882.

## RESINA SCAMMONII.

BY CHARLES A. T. DOENCH, PH.G.

*From an Inaugural Essay.*

The author endeavored to purchase scammony root in Philadelphia and New York, but failing in this procured a quantity from London through a Philadelphia house; the root was of fine appearance, and answered the description of the genuine root in every respect. It was powdered and passed through a sieve, No. 60, and in a percolator exhausted with stronger alcohol, after a prolonged maceration for five days. From 5 kilos of the root 8 liters of tincture were obtained; to this half a liter of water was added, most of the alcohol was recovered by distillation, and the residue, measuring nearly two liters, was poured into a large quantity of cold water. The precipitated resin was repeatedly washed with warm water, then dried, redissolved in a small quantity of alcohol, filtered, again precipitated in the manner described, and carefully dried. The yield was 270.46 grams, or 5.4092 per cent.

Thus obtained, the resin was of a greenish-gray color, and answered the tests of the Pharmacopœia for the resin of scammony. Its behavior showing a decided difference from that of some commercial scammony, three samples of the latter were procured from different wholesale houses, and examined by treating 5 grams of each successively with ether, benzol, oil of turpentine, alcohol and water; each solution was evaporated, by means of a water-bath, to dryness, and the residue weighed, when the following results were obtained:

	Soluble in					Insoluble matter.
	Ether.	Benzol.	Oil turp.	Alcohol.	Water.	
I.	1.574	0.025	0.020	1.270	1.030	1.081
II.	1.173	0.023	0.720	0.303	1.574	1.199
III.	2.695	0.022	0.434	0.733	0.586	0.530

The ethereal extracts were dissolved in warm solution of potassa,

and to the solution an excess of hydrochloric acid was added, which in each case produced a precipitate; this was weighed, the weight deducted from that of the ethereal extract, and the remainder regarded as pure scammonin, amounting in I to .599 gram, or 11.98 per cent.; in II to .546 gram, or 10.92 per cent., and in III to 2.258 gram, or 45.16 per cent. The precipitate from I was dark brown, and was not colored brown or cherry-red by concentrated sulphuric acid, nor did it acquire a blue color with oxidizing agents, and was therefore neither rosin nor guaiac resin. The precipitates from II and III were light yellowish-brown, became dark red with sulphuric acid, and were regarded as consisting chiefly of rosin.

The portions dissolved by benzol, oil of turpentine and alcohol were not further examined, since they could not contain any scammonin.

The aqueous solutions were heated to boiling; a precipitate occurring was treated with solution of potassium nitrate to ascertain from the solubility therein its identity with vegetable albumin. The boiled liquids filtered were tested with subacetate of lead and with borax for coloring matter and gum, and with Fehling's solution for sugar. The results were as follows:

Color.	Heat.	KNO <sub>3</sub> .	PbAc.	Borax.	Fehling's solution.
I. Light yellow.	Curdy precp.	Soluble.	Copious precp.	Copious precp.	No precp.
II. Straw color.	Curdy precp.	Partly soluble.	Precipitate.	No precipitate.	Precipit.
III. Dark color.	No precipit.	.....	Precipitate, decolorized.	No precipitate.	Precipit.

The ashes obtained on incinerating the samples were incompletely soluble in dilute hydrochloric acid; the acid solutions contained calcium and, in samples I and II, also magnesium.

## ON THE ACTION OF IODINE PENTABROMIDE ON VOLATILE OILS.

BY CHAS. MCCLELLAN FORNEY, PH.G.

*From an Inaugural Essay.*

The author prepared iodine pentabromide,  $\text{IBr}_5$ , by dissolving 127 grains of iodine in 400 grains of bromine. All the oils used were of the best commercial quality, and pure. The test was applied by placing 5 or 6 drops of the volatile oil on a watch-crystal and adding 1 drop of the pentabromide. Corresponding experiments were performed, also, with the same volatile oils previously mixed with 25 per cent. of oil of turpentine and the same proportion of 95 per cent. alcohol. Croton oil was examined in the same manner. The results are tabulated as follows:







OILS.	Pure Oils.		Oils + 15 per cent. Oil of Turpentine.		Oils + 25 per cent. Alcohol.	
	Reaction.	Color.	Reaction.	Color.	Reaction.	Color.
Almond, bitt'r Amber, rectifd	None. Slight.	Orange-red. Cloudy green; dark precip. Brown-red.	Sl't react'n and sputter'g. Brisk; efferv.; sl't sputt'g. Very violent.	Brownish-yel. Brown-red. Yellowish-brn.	None. Slight effervescence. Brisk; slight effervescence and sputtering.	Orange-red. Cloudy olive; black precip. Brown-red.
Anise. Bay.	Violent; sputtering. Violent; brisk efferves- cence; sputtering.	Brownish-gr'n. Olive-green.	" " " "	Colorless or yel- lowish. Brownish, then greenish-yel.	" " " " " "	Olive-green. Brownish. Brown-red.
Bergamot.	Violent; brisk efferves- cence; sputtering.	Greenish-yel. Greenish-br'n.	" " " "	Reddish-brown Cloudy, black- ish brown.	Brisk effervescence. Slight "	Cloudy, brown- ish-yellow.
Camphor.	Violent; brisk efferves- cence; sputtering.	Cloudy, black- ish-brown.	Brisk effervescence. Very violent.	Olive-gr'n, then greenish-bl'k. Dark brown.	" " " "	Yellowish to greenish-br'n. Brown-red.
Caraway.	Viol't; brisk effv.; sputt'g.	Br'n sediment.	" "	Brownish, then olive - green, bl'k precip.	Brisk; slight efferves.	Cloudy, yellow.
Cassia.	Slow, slight effervescence.	Green.	Brisk; efferv.; gr'n vapors.	Brown-red.	Slight; green vapors. None.	Green. Cloudy, yellow.
Cinn'n, Ceyl'n	Viol't; brisk effv.; sputt'g.	Greenish-yel. Gm'ish-yel.; dk gr'n upon mix- ing or stirring.	Very violent.	Cldy, lanky, then clear, olive-gr'n Dark brown.	Like pure oil. Slight effervescence.	D'k to light g'n. Red-brown.
Cloves.	" " "	Brown-red.	" "	Brownish-yel.	Brisk; sl't eff. and sputt'g.	Cloudy, yellow- ish-brown.
Copaiba.	Sl't; gentle eff.; gr'n vapors	Brownish-red. Gr'n; bl'k prep.	" "	Straw-yellow. Sea-green.	Brisk effervescence. Brisk; sl't eff. and sputt'g.	Brownish-red. Gr. and br. lay- ers; after mix- ing, dark gr'n
Croton.	None.	Greenish-br'n.	" "	Greenish-br'n.	Brisk; slight efferves.	Yellowish-br.
Cubeb.	Viol't; brisk effv.; sputt'g.	Brownish-yel. Black precip.	" "	Cloudy, d'k yel. Cloudy, dirty violet; then clear, d'k yel.	Brisk; sl't eff. and sputt'g.	Yellow and br. layers; not miscible.
Fennel.	" " "	Cloudy, black- ish-brown.	" "	Dark brown.	" " "	Brownish-yel.; brown precip.
Hemlock.	" " "	Cloudy, black- ish-brown.	" "	Cldy, purplish- black; then blue-bl'k and lanky-green.	Like pure oil; less sputt'g.	Dark brown.
Horsemint.	" " "	Greenish-br'n.	" "	Greenish-br'n.	Brisk; sl't eff. and sputt'g.	Bright green, then cloudy.
Juniper.	" " "	Reddish-brown Yellowish, then light gray.	" "	Reddish-brown	" " "	Cloudy, green- ish-brown.
Lavender.	" " "	Greenish-br'n.	" "	Reddish-yel. Greenish-br'n.	Like pure oil.	Reddish-brown
Lemon.	" " "	Brownish-yel.	" "	Reddish-brown	" "	Light brown.
Orange.	" " "	Black precip.	" "	Reddish-brown	Brisk; sl't eff. and sputt'g.	Cldy, yel'ish-br. Brownish-yel.
Pennyroyal.	" " "	Cloudy, black- ish-brown.	" "	Reddish-yel.	" " "	Light brown
Peppermint.	" " "	Cloudy, black- ish-brown.	" "	Reddish-yel.	" " "	Yel. and r'd lay- ers; not mis- cible.
Pimenta.	" " "	Greenish-br'n.	" "	Reddish-yel.	" " "	Cloudy yellow.
Rosemary.	" " "	Reddish-brown	" "	Reddish-yel.	" " "	
Sassafras.	" " "	Yellowish, then light gray.	" "	Reddish-yel.	" " "	
Savin.	" " "	Greenish-br'n.	" "	Reddish-yel.	" " "	
Spear-mint.	" " "	Brownish-yel.	" "	Reddish-yel.	" " "	
Spruce.	" " "	Dark brown.	" "	Reddish-yel.	" " "	
Tansy.	" " "	Brownish - yel., then colorless.	" "	Reddish-yel.	" " "	
Wintergreen.	Slight; gentle efferves.	Reddish-br'n.	More active than with pure oil.	Straw color.	Slight effervescence.	



The behavior of the oils of cinnamon, cubeb, juniper, lemon, orange, peppermint and tansy under the above circumstances seems to deserve attention. Except in a few instances, violet and orange-colored vapors were evolved during the reaction. The reactions were increased in the presence of oil of turpentine and diminished with alcohol.

## CHLORINATED OIL.

BY L. WOLFF, M.D.

Under the above title I read, at the pharmaceutical meeting of May 6th, a paper which was printed in the June issue of the "American Journal of Pharmacy," and which at the time I thought to be the first account of this preparation, although I made no claim to that effect.

That there seems to be nothing new under the sun is in this instance again very striking, for Prof. Maisch called my attention recently to a letter from Mr. Hans Wilder, stating that in the German edition of Jourdan's "Pharmacopœia universalis" of 1846 this matter had already been printed. I reproduce it here to show how close alike was my own effort to that of yore, although I need hardly assure here that my experiments were altogether independent and without knowledge of earlier ones on this subject. I quote from the "Pharmacopœia universalis," second edition, London, published by Joseph Robins, 1833, vol. I, page 460,<sup>1</sup> as among the chlorine preparations:

"Oil with Chlorine.

"*Oleum olivarum oxygenatum* (Bat.)

R Olive oil, . . . . . 16 oz.

"Put it into a large receiver, surround with cold water or snow, and pass through it a current of gas, disengaged from a mixture of one pound of muriate of soda, four ounces of oxide of manganese, and half an ounce of sulphuric acid diluted with water. At the end of two or three days, wash with water and preserve it.

"It is recommended by Nieman in tinea and herpetic ulceration."

As my paper did not claim as novelty the combination of chlorine with oils, but rather the exposition of how they combine, I think its value none the less, especially as, judging from the name of the older product, its chemical composition was certainly not understood; nor have I been able to find anything in literature illustrating or explaining the chlorine compounds with fat oils.

<sup>1</sup> The formula was also published in the original French edition of Jourdan's work of 1828.

Why the earlier writers should have adopted the name of oxygenated oil for it is hard to be explained, but that it was already at that time used with good effect in parasitic skin diseases seems to bear out what I had claimed for it.

I would add to what I had already said in my paper on the chlorination of fat oils, that for practical purposes it can be much easier and much more rapidly prepared by the direct contact between the oil and the chlorine generating mixture. The rapidity with which the chlorine is taken up by the oil leaves none to be detected in excess until the saturating point has been reached. I employ for this purpose a flask of ample capacity, and introduce a sufficient quantity of manganese peroxide with hydrochloric acid. After stirring I add the oil and place the whole in a water-bath, warming until active ebullition takes place. When vapors of free chlorine gas become evident, the process is finished. The oil is then allowed to separate, and is dissolved from the mass by benzin, which, on filtering and evaporating, leaves a chlorinated oil, saturated and of the description given by me previously.

October, 1882.

## AN EASY METHOD FOR ASSAYING THE CINCHONA ALKALOIDS.

BY R. F. FAIRTHORNE, PH.G.

Dr. J. E. De Vrij has written very favorably of a process for determining the amount of alkaloids in cinchona, which depends chiefly upon the facts that they are dissolved out by means of a mixture consisting of ether, 88 parts; solution of ammonia, 4 parts; and alcohol, 8 parts. After maceration and separation the solution is evaporated to dryness leaving the crude alkaloids, which are purified by solution in acidulated water, filtration and precipitation by means of an alkali and resolution in chloroform, which upon evaporation leaves the alkaloids pure.

It occurred to me that as the alkaloids are soluble in chloroform, that the following process would yield good results with less trouble and expense, and after having tried it I find by comparing it with Dr. De Vrij's that as good a yield of the alkaloids is obtained. Two portions of the powdered bark taken from the same package were operated on by the two processes and with identical results. By my method 400 grains of calisaya bark in moderately fine powder were boiled for ten minutes with 5 fluidounces of water acidulated with  $\frac{1}{4}$

drachm of muriatic acid ; when cool the liquid portion is filtered through absorbent cotton placed in the neck of a funnel, into which the powder having been transferred is rather tightly pressed, and two fluidounces of water poured on and allowed to percolate. This is added to the filtrate, and the powdered cinchona again boiled with 5 fluidounces of water acidulated with 30 minims of hydrochloric acid. This decoction is filtered in the same manner as the first, using the same funnel and cotton. The bark is then thoroughly exhausted by percolation with acidulated water, the acid used being muriatic in the proportion of 5 minims to the fluidounce. It required about 5 fluidounces to accomplish this. All the filtrates are now mixed and then refiltered through absorbent cotton. The filtrate is next thoroughly agitated with six fluidrachms of chloroform. When the chloroform has subsided the supernatant liquid is drawn off and the last portions carefully collected by means of a pipette. This operation is repeated with six more fluidrachms of chloroform. To the acid decoction is added solution of soda so as to render it strongly alkaline, and to this one and a half fluidounce of chloroform and well shaken. The latter having been removed to a tared capsule, the decoction is again agitated with six more fluidrachms of chloroform. This having been separated is poured into the capsule with the other portion of chloroform and allowed to evaporate at a moderate temperature. This leaves the alkaloids in a comparatively pure state, which weighed 16.20 grains.

The amount of alkaloidal residue left by De Vrij's process after evaporating the chloroformic solution was 16 grains. In order to obtain the active principles of the bark perfectly pure, dissolve this residue in 1 fluidounce of water acidulated with hydrochloric acid, agitated with 2 fluidrachms of chloroform ; remove this, and having added 1½ ounce of water and the same quantity of chloroform to the acid solution, render it decidedly alkaline by means of soda solution ; agitate, remove the chloroform to a tared capsule, and repeat the process with 2 more fluidrachms of chloroform, which, when removed, is to be added to the rest and evaporated.

By this means a satisfactory determination of the percentage of active principles of Peruvian bark can be obtained without much trouble. The freshly precipitated alkaloids are soluble in chloroform, which affords a convenient mode of separating them. The various steps of this assay will be readily understood. By boiling the bark in acidulated water the natural combinations of the alkaloids are broken up by means of the stronger acid. Agitation with chloroform in the first place, before



the addition of the soda, removes any wax, resinous or oily substance present, and the subsequent treatment with a fresh portion after being rendered alkaline removes the alkaloids, whilst most of the coloring matter is retained by the aqueous portion. In order to save the chloroform distillation can be resorted to, care, however, being taken to remove any adhering alkaloid by repeatedly washing with chloroform the retort used.

### DORYPHORA DECEMLINEATA.

BY JOHN D. FORBES.

*From an Inaugural Essay.*

*Experiments with the Live Beetles.*—The beetles were mashed in a mortar and macerated with different solvents.

Alcohol yielded a dark oily extract, having the characteristic odor, and when mixed with an equal quantity of resin cerate produced no irritation of the skin. The extract redissolved in alcohol and mixed with carbon bisulphide separated into three layers, the lowest of which was dark brown and soluble in water; neither this nor the two light-yellow layers above produced irritation of the skin.

Acetic ether yielded a tincture, which on treatment with carbon bisulphide separated likewise into three layers, in neither of which the presence of cantharidin was indicated.

Benzin used as a menstruum and the product treated with bisulphide of carbon, yielded a dark oil and extractive matter, but no trace of cantharidin.

The beetles were exhausted with potassa solution, the liquid neutralized with acid, evaporated, the residue treated with water and the undissolved portion taken up with alcohol; on evaporation a dark granular mass was left, which mixed with an equal weight of resin cerate, produced on the skin in three hours slight irritation and redness.

*Experiments with the Dried Beetles.*—The beetles were killed with ether, dried, powdered and exhausted by chloroform. On treating the product with carbon bisulphide a supernatant dark oily layer and a heavier light-brown liquid were obtained, of which the former, when applied to the skin of two persons, produced a tingling, burning sensation, and in twelve hours vesicles formed under the irritated surface. The remaining solution, evaporated to dryness and mixed with resin cerate, produced only slight irritation.

It follows from the above that the potato bug contains a vesicating principle, but it is uncertain whether it be identical with cantharidin.



## A BISMUTHIC HAIR-DYE.

BY A. NAQUET.

The author states that he was induced by a knowledge of the injurious properties of the many hair-dyes that are put forward as perfectly harmless to make the attempt to produce one that should be fairly entitled to that description. Whilst working upon the subject he protected the different steps by patents, in order to secure priority, but having attained what he considers to be a satisfactory result he has now abandoned his rights for the public benefit.

M. Naquet's experiments were made in the direction of compounding a metallic tincture that should have an innocuous metal for a basis instead of lead, and for this purpose he selected bismuth. The preparation which was the subject of his first patent consisted of two solutions that were mixed immediately before being used, and he describes the method of making it as follows.

It has long been known that a solution of bismuth is obtained in treating bismuthic hydrate with a solution of bitartrate of sodium; but it is not very easy to prepare and not more than a very small proportion of the bismuthic hydrate employed is ever dissolved. M. Naquet therefore sought an easy method of preparing the double tartrate of potassium (or sodium) and bismuthyl ( $C_4H_4NaBiOO_6$ ). The bismuth is dissolved in the smallest possible quantity of nitric acid and to this is added an aqueous solution of tartaric acid (3 parts of acid to 5 of bismuth) and a large quantity of water; the whole is then thrown on a filter and the precipitate washed. The wash water contains some bismuth, which can be removed by precipitating with a sulphide, then redissolved in nitric acid and used in a subsequent operation. The well washed precipitate, whilst still moist, is dissolved in a boiling solution of sodic bitartrate (12 to 15 parts of bitartrate to 5 of bismuth), then filtered, diluted with water, alcohol and glycerin, and again filtered. Each liter should contain 150 cc. of glycerin, 150 cc. of alcohol and 600 cc. of water. The proportion of bismuth present should be 2 grams of metal per 1,000 and if the liquor contains more or less it should be brought to that strength. The paper through which this liquid is filtered will retain some bismuth, precipitated by the alcohol; this can be redissolved in nitric acid and again used.

The bismuthic solution alone does not dye, but mixed with sodium hyposulphite it soon deposits sulphide of bismuth which dyes the

beard and hair. But as this mixture is quickly decomposed it must not be made until just as it is going to be used. This form of bismuthic hair-dye, therefore, requires to be sent out in two bottles, one containing the bismuthic solution, the other the solution of sodium hyposulphite (1 part of solution saturated in the cold diluted with 5 parts of water). When required for use these are mixed together in equal proportions.

The bismuthic product precipitated by tartaric acid and water can be dissolved by means of carbonate of potash, or by any of the caustic or carbonated alkalis, including ammonia, the liquid being after neutralized by a current of carbonic acid gas and filtered. But unfortunately this neutral product, or even one slightly alkaline, does not act as a dye when mixed with either hyposulphite of soda or flowers of sulphur. It can only be used by moistening the hair first with the bismuthic liquid, and then, after it has dried, with a solution of sulphydric acid or a sulphide.

This dye is said to have a progressive action, and to produce all the shades from a light flaxen to a deep chestnut color, according to the number of applications made.

The second patent was taken out for a preparation that could be sent out in one bottle, M. Naquet while pursuing his investigation, having found that an ammoniacal solution of the tartrobismuthic product will keep indefinitely when mixed with solution of hyposulphite of soda, if the containing bottle be kept well closed. Such a mixture is said to make an admirable hair-dye, it decomposing and depositing sulphide of bismuth in proportion as it loses ammonia and is acted upon by carbonic acid in the atmosphere. The degree of concentration of the liquid is not of great importance, nor the quantity of ammonia. The following is the working formula given by M. Naquet:

Dissolve 100 parts of bismuth in the smallest possible quantity of ordinary nitric acid (about 280 parts). To this liquor add a solution of 75 parts of tartaric acid in water and then a rather considerable quantity of water to ensure complete precipitation. The whole is then thrown upon a filter and the residue washed with water until the washings are no longer acid. The magma left on the filter is then put into a dish and solution of ammonia gradually stirred in until all is dissolved. The magma derived from  $1\frac{1}{2}$  kilogram of bismuth will require 0.8 or 0.9 liter of ammonia. To this liquor is added 75 parts of hyposulphite of soda in powder, and when the salt is dissolved the

product is filtered and put into bottles. In this state it is ready for sending into commerce, but it is of advantage to add 1 or 2 per cent. of glycerin; no addition of alcohol is necessary. The liquid so prepared would contain about 5 per cent. of bismuth. It may be further diluted with water if desired.

The hair or beard when saturated with this liquid acquires after five or six hours a deep chestnut color. Upon washing the hair this color disappears, giving place to a delicate flaxen color. By repeating the operation daily a stage is arrived at when, after passing through all the intermediate shades, the deep chestnut color remains persistent.—*Phar. Jour. and Trans.*, Sept. 16, 1882, from *Moniteur Scientifique*, [3], xii, 880.

---

RELATIVE VALUE OF ETHER WHEN PREPARED WITH  
"RECTIFIED" OR METHYLATED SPIRITS OF WINE.

BY H. BENDELACK HEWETSON,

Honorary Consulting Surgeon, Reynard Hospital, Willingham Honorary Ophthalmic  
and Aural Surgeon, Yorkshire Institution for Infant Deaf and Dumb;  
Acting Surgeon, 7th West Yorkshire Rifles.

The subject of the safest drug with which to produce anæsthesia has been sufficiently discussed, and the verdict of those best able to judge has been given, out and out, in favor of ether, as against chloroform, when "properly administered by a skilled etherist." There are, however, two samples of ether in the English market to the relative value of which, I believe, the profession is not fully alive. The two forms of "spirits of wine" used in the manufacture of ether create in reality two kinds of ether, and the differences between them are important. Firstly, the ether prepared from a rectified spirit is found less desirable as an anæsthetic by those who have used it, and it is not considered as safe, producing more sickness and laryngeal spasm in certain cases in which there is a tendency to such complications. Secondly, it is about twice the cost. For instance, the methylated ether costs 2½d. per ounce, and the rectified ether costs 4½d. per ounce. I have not used the rectified ether in my own work, so cannot speak of individual experience of its actions. But of the use and applicability of the methylated ether—as the safest anæsthetic known, when carefully administered by means of Clover's inhaler—I can speak strongly as the result of my daily observation.

It is a very ordinary circumstance to occupy eighty seconds in pro-

ducing complete anæsthesia, without a struggle or a cough, and it is by no means extraordinary for a patient to be "fully under" *within* the minute.

In the case of short operations upon the eyes and the like it is hardly ever necessary to reapply the inhaler after it has been once removed for the operator to commence, the patient remaining sufficiently anæsthetic for an operation such as I have mentioned to be completed without hurry.

Anæsthesia can be prolonged with equal safety, even so far as to keep a patient in labor completely under its influence for upwards of *four hours*, the longest time which has happened in my experience.

Mythylated ether is, I consider, from this point of view, the safest and cheapest anæsthetic at present in use.—*Chemists' Jour.*, August 18, 1882, from *The Lancet*.

---

#### CHINESE CAMPHOR.

In China camphor is grossly adulterated with a glue obtained by boiling a rattan creeper, locally called T'engtsai. This weed, growing luxuriantly in the interior of Formosa, from whence, as everyone is aware, all Chinese camphor is derived, is full of a glutinous matter which boiling water converts into a colorless glue. Mixing this with the pure camphor and a small percentage of water prevents evaporation, though naturally destroying the high quality of the article itself. Camphor so adulterated will keep, it is said, for a couple of months without loss; indeed, will bear the journey to Europe without suffering appreciable diminution. Experiments recently made have demonstrated the existence of two parts of glue to three of camphor in certain samples offered in the Tamsui market, rendering the article absolutely useless. Happily fire will readily detect the foreign body. Mr. Walter Lay, to whose admirable report upon the camphor trade in 1880 we are indebted for this information, adds: "I have obtained a sample of the plant from which the glue is obtained, but cannot find out what its botanical name is; indeed, I have not succeeded even in obtaining the correct Chinese characters for it. It is called locally T'engtsai, but it doubtless has a more distinctive appellation than that. It is not given in the 'Topography of Tamsui.' Mention is made in the Wahu Report for 1878 of a plant which yields a glutinous sub-

stance on being boiled in water, and which is used in the manufacture of paper. The name given to it at Wahu is Yang Kout'eng, and this possibly may be the name of the creeper used here for the adulteration of camphor."

Before the ruthless axe of the Chinese woodcutter the beautiful inland forests still adorned by the graceful *Laurus camphora* are fast disappearing. The aborigines inhabiting the interior fight desperately for the possession of their woods, but each year sees a fresh tract surrendered to their indomitable enemies. To illustrate the difficulty attending the collection of the prized wood it may be mentioned, on the authority of the above-named gentleman that between five and six hundred Chinese were killed two years ago in the petty warfare which prevailed with the savages. Sooner or later there must be a dearth of camphor. With their customary want of common prudence the conquering race are recklessly clearing the ground for tea cultivation, burning up the camphor wood in tea-firing operations, for which purpose it can seemingly be used with great safety, despite the pungent fumes given forth.

Very little of the camphor manufactured in Formosa is consumed by the Celestials, nearly all being shipped to foreign countries. On the other hand, they continue importing for their own use the more precious natural article secreted by the *Dryobalanops camphora* of Sumatra and Borneo. For these concrete masses, commonly known as Camphor Baroos, fancy prices are still paid,—31s. a pound was the import price at Ningpo last year. Of this fine camphor, it may be added, but a small quantity finds its way to Europe; the relative cheapness of the manufactured article driving it quite out of our markets, although it is well known the native manufacturers in Formosa place no special reliance on their own product, which, they say, possesses little or no virtue—very little nowadays, one may opine, if adulteration is carried on to the extent asserted.—*Phar. Jour. and Trans.*, Sept. 16, 1882; from *Med. Press and Circular*, Aug. 2, 1882.

## REMARKS ON THE ROOT OF ACONITUM NAPELLUS AND OTHER SPECIES.

BY E. M. HOLMES, F.L.S.

*Read before the British Pharmaceutical Conference.*

Although aconite has been used in medicine for at least a hundred years, and is recognized as one of the most powerful of medicinal



agents, its internal use is not quite so general in this country as its properties might lead us to expect. Perhaps this is owing to variation in strength of the official preparations, and to the known danger of using too large a dose. How far this variability is due to a non-recognition in the Pharmacopœia of well-known facts may be open to question, but it appears certain that the requirements of that book might be complied with, and yet that preparations very variable in strength might be the result. That such is the case is proved by the statements made by Mr. Cleaver concerning extract of aconite, and by the recent experiments made with the alkaloid, which have shown that one commercial sample may be seventy times stronger than another.

The Pharmacopœia describes aconite root thus :

The dried root of *Aconitum Napellus*, L. The root may be "imported from Germany, or cultivated in Britain, and collected in the winter or early spring, before the leaves have appeared."

In the first place the figure of the root referred to is totally inadequate to distinguish the root of *A. Napellus* from that of other less poisonous species, the variation in form being very great, according to the age and position of the root. In the second place the root imported from Germany is collected by peasants who, as a rule, are not possessed of botanical knowledge, and is sold without any guarantee that it is collected in winter or early spring; indeed it is difficult to understand how the root of *A. Napellus* could be found before or distinguished after the leaves have appeared. Thirdly, the root is not cultivated as a crop in this country, because it could not compete in price with the German drug.

Under these circumstances it is easy to understand why the alkaloid of commerce varies in strength and why the preparations are also liable to a similar fault. It is also obvious that even the most careful chemical investigations of the commercial root must be founded on an unreliable basis, and that the results obtained by chemical analysis must, in consequence, be to a certain extent devoid of scientific value.

It becomes extremely important, therefore, that so powerful an agent should receive at the hand of the pharmacist far more attention than has hitherto been accorded to it, and that every means should be used to provide the medical profession with preparations of aconite as nearly as possible of uniform strength and perfectly reliable. This is the more desirable since aconite is now being used in the treatment of the lungs, in puerperal and other fevers, and in acute cases in which



prompt and reliable action is of the utmost consequence. The chief difficulty in making such a preparation is in obtaining the typical variety of the right species. De Candolle describes twenty-nine varieties of the official species, *Aconitum Napellus*, but whether all these forms, which possess the same specific botanical characters in common, have the same chemical constituents, and whether, like isomorphic crystals and isomeric bodies in general, they have a different physiological action, is very difficult to ascertain, seeing that it is by no means easy to identify them, for the following reasons: First, because a complete series of the members of the genus is hardly to be found for reference in any botanical garden or museum; secondly, because the varieties sold by florists are not always carefully named; and thirdly, because they cannot be procured in sufficient quantities for purposes of chemical investigation.

Moreover, botanists are not agreed as to the forms which should be placed under each species. Steudel enumerates about eighty which have been grouped under *A. Napellus* by different botanists. The aconites are so closely allied, and the varieties run so much into one another, like the willows, brambles, roses, mints and cinchonas, that even De Candolle has placed the same plant under two varieties. Professor Maximowicz, who has paid considerable attention to the species occurring in Japan, remarks, in a recent letter: "The genus *Aconitum* is, botanically speaking, a most difficult one, not one characteristic holding its own from species to species. It is a matter of personal opinion whether you accept a dozen species in all, while another thinks to separate thrice the number. I have observed them in Mandshuria and Japan very assiduously, and have despaired of finding well-defined species, for there will arise intermediate forms between such as in most cases are thoroughly different. One would think these were numerous hybrids, but they are as freely seed-bearing as the various hybrid aquilegias used to be."

Although it is almost impossible to define accurately in botanical terms the different aconites, it seemed to me worthy of inquiry whether those available for pharmaceutical purposes might not be characterized sufficiently for all practical purposes. It is well known that the Japanese peppermint plant, although botanically it offers no character to separate it from *Mentha sativa*, is already distinguishable by taste, and it is therefore natural to suppose that the different forms of aconite might be distinguished to a certain extent in the same way. Experi-

menting in this direction I found that the roots of several species of aconite did not cause a tingling sensation when chewed, and that this was the case not merely with the Asiatic species, *Aconitum uncinatum*, *heterophyllum* and *palmatum*, but that also several plants which present the specific characters of *A. Napellus*, although easily distinguishable from it by habit, present the same peculiarity. Of these I may mention that forms which were supplied to me under the names of *A. Napellus*, var. *pyramidale* and *paniculatum*, did not cause tingling when chewed, while others, such as *Stoerckeanum* and *albiflorum*, produced a slight, and others again, such as *A. autumnale*, a very powerful tingling sensation. Here a difficulty is met with in the fact that the plants are not always correctly named, either in botanical gardens or in the collections of florists, from labels becoming displaced. But all of the aconites in which this variation occurs, so far as I have observed, flower later than the typical *A. Napellus*, so that if the Pharmacopœia added to its description "the root obtained from plants flowering in May and June," and erased the words "imported from Germany," one cause of the unequal quality of the root would be removed. This is all the more important, since I have determined by direct inquiry that some florists would supply to a grower the plant flowering in May and June, and others would supply any variety of *A. Napellus* that happened to be in stock, no difference in the properties of the varieties being known to them. The only way to secure aconite of good and uniform quality appears to be to limit the official drug to home-grown aconite, flowering in May and June, and gathered when the plant is in flower. In this way there can be no mistake about the species, and the leaves collected at the same time could be used for making extract. Even if the root were thus not gathered in its most active condition, it would at all events have the advantage of uniformity of strength, which is of much more importance.

The aconite has the property of developing roots instead of leaf buds in the axils of the lower leaves, provided that these are covered with soil. Whether this property has been conferred on the plant with the view of enabling it to approach nearer to the surface when, as must often happen in its native mountains, the plant becomes almost buried by the fall of *debris*, or the earth washed away from the roots by floods, or to propagate the species when not under favorable conditions for producing seed, it could at all events be turned to account in cultivation, since

by earthing up the stems a larger yield of roots would probably be insured.

In testing aconite root by taste it must be remembered that the tingling sensation is often not developed for ten minutes, and lasts for two or three hours, so that half a day must be allowed to elapse before tasting a second sample, to prevent the chance of confounding the effect of one root with that of the next.

In conclusion, aconite is very easy of cultivation, and, considering the small quantity used, there is no reason why any chemist who has a small piece of garden should not grow his own aconite root.—*Phar. Jour. and Transactions.*

---

## PREPARATIONS OF ACONITE.

BY DR. E. R. SQUIBB.

The tendency of the past few years to increase the number of the preparations of this among other very important and very active drugs, is very confusing and very unfortunate. One or two alternatives or duplicates each, for internal and external uses, should be sufficient for each active medicine, and then these could be easily understood and their relations of strength could be easily remembered. In the case of aconite, some of the confusion has arisen from changing the source of the preparations. Many years ago, when the leaf of the plant was alone used, it was shown that this part of the plant was much more variable in strength and more perishable than the root, and this was a very good reason for the change which then began, from the leaf to the root, and now preparations of the root are commonly used, but, unfortunately, those from the leaf are not yet entirely abandoned as they should be.

Then the alkaloid aconitia came into use, at first for external application only. But the use has very largely increased, and it is now given internally to a very considerable extent. Gradually the alkaloid of several prominent makers came into the market, and these were soon found to be of very different degrees of strength and untrustworthy and unsafe; and in all statements of dose or effects the particular maker had to be given, the average dose varying all the way between the  $\frac{1}{4}$  and the  $\frac{1}{200}$  of a grain. Then again, the very strongest of these when the dosage was compared with that of the root, bearing no apparent relation, the root being far stronger, or the alkaloid

far weaker in effect than ought to be from what was known of their relative alkaloidal value.

Then again the relation of strength between the leaf and the root has been left unsettled. Statements are to be found, by good authorities that they are equal in strength, and Stillé and Maisch (see The National Dispensatory, 1879, p. 97), give the minimum dose of powdered leaves or root as one or two grains, as though they were of the same strength. On the other hand, Bentley and Trimen (see Medicinal Plants, Vol. 1, No. 6), make the following statement: "Aconite root is by far the most active part of the plant; it is said to have six times the strength of the leaves." For these extremes many intermediate comparisons are to be found, and the writer up to this time has accepted the statement that the root was one-fifth stronger than the leaf, but now finds this to be a great and important mistake.

Of course all the preparations from the leaf have been duplicated in those from the root as the latter have come into use, and one or two have been added, so that the confusion has been and still is very great and dangerous.

There is now, in not very infrequent use, a powder, fluid extract, extract and tincture of the dried leaf, and an extract of the green or undried leaf. Then there is in more common use a powder, fluid extract, extract and four tinctures of very dissimilar strength, made from the dried root, and all these from the common officinal variety, the *Aconitum Napellus*. Then there are at least four very different aconitias or aconitines in common use in this country, and one or two more in Europe. There are, first, the ordinary "aconitia" or "aconitin," sold by one or more prominent manufacturers of chemicals in this country, but generally supposed to be imported from Germany. Second, the aconitine made by Merck, of Darmstadt, and bearing his label. This is largely sold and is supposed to be made from the *A. Napellus*. The same maker sends out an aconitine at more than three times the price of the first, labeled "Aconitine from Himalaya Root," probably from the *A. ferox*. Then Duquesnel, of Paris, sends out an aconitine which is in well-formed, colorless crystals, at about three times the price of the last. That is, the first aconitine costs about \$14.00 an ounce, avoirdupois. That of Merck costs about \$13.00 an ounce. The second, of the same maker, about \$40.00 an ounce.

and that of Duquesnel about \$105.00 an ounce, or \$3.75 per gram, by wholesale.

It is the general object of this note to ascertain the strengths of these various forms in which this important medicine is used, and to compare them so that equivalent doses may be known, thus endeavoring to clear up some of the dangerous confusion of dosage as it is now found in the books.

In order to do this in the simplest way, a standard of strength must be adopted by which to measure all the preparations; and the process by which the strength of the standard is obtained must be applied to all.

The best standard would of course be the proportion of aconitia, as that is the most important, though perhaps not the only useful active principle. But aconitia is in such very small proportion that no process of assay as yet prepared is practically applicable, or within the ability of the writer to apply. Besides, as will be seen later, aconitia, as met with, is quite as variable as the preparations of aconite, and this probably from different processes of extraction as well as from different species of aconite.

Some years ago (see Proceedings of The Amer. Pharm. Asso. for 1872, p. 229,) the writer published a note on aconite root, in which he gave a very easy test of the value of the root. At that time by careful selection bales of aconite root could be found in which, from an ordinary handful sample, eight roots out of ten, when broken at about the middle of the root, and a very small fragment bitten off and chewed for a moment between the front teeth, and in contact with the tip of the tongue, would give the peculiar aconite tingling sensation to the tongue and lips. This would be perceived within a few minutes, and would continue for a longer or shorter time in proportion to the size of the piece taken, and the strength of the root, as no two roots have precisely the same activity. This simple mode of testing has now served the writer well for some fifteen years past, and in 1872 eight pieces out of ten was a pretty high standard to adopt, but for two or three years past it is not uncommon to find bales in every large lot, of which every piece will give the distinct aconite tingling or numbness in some degree, and any one can get such an aconite root who will take the time and pains to select it. Therefore such root is now adopted as the standard for the purposes of this paper, and this physiological measurement



of the strength is also adopted. Of course, the taste or impression as a measure of strength cannot pretend to be very accurate, nor indeed accurate at all, but it is a very useful measure, and will serve all the practical purposes of the physician and the pharmacist. It is very highly probable, though of course not quite certain, that any aconite which does not give this sensation of tingling and numbness to the tongue, lips and pharynx is inert, and that the activity is in direct proportion to the amount or degree of the sensation from a given uniform quantity. Any bale of aconite root, every piece, or nearly every piece of which gives the tingling in some degree, must be powdered in order to get any fair average, and therefore it is the powder that must be adopted as the standard. But the powder is difficult to manage and to subdivide properly, and so its liquid equivalent, the fluid extract, is much better. A fluid extract well made by repercolation, and without heat, from such root, so as to represent the powder in the proportion of a minim to each grain, forms an excellent standard. It has become fashionable of late to add an acid and glycerin to the menstruum in making this fluid extract, but as they are neither necessary nor useful they are objectionable, alcohol alone serving all the purposes of complete exhaustion and preservation of the active principles. Any well-made fluid extract of good aconite root if added to water in the proportion of one part to six hundred, or one-tenth of a minim in a fluidrachm, will give a distinct aconite impression to the tongue and mouth under the following conditions:

Put 12·5 fluidounces or 369 cubic centimeters of water into a proper vessel and add to it, from an accurate pipette, 10 minims or ·616 cubic centimeter of the fluid extract of aconite root; stir well, and allow it to stand covered for an hour. This forms a cloudy solution or mixture from which, however, nothing settles out.

If now the mouth be rinsed out well to free the surfaces from mucus and saliva, and a fluidrachm or 3·7 cubic centimeters of this solution be taken into the anterior part of the mouth, and be held there in contact with all the surfaces for one minute by the watch, and be then discharged, no immediate sensation will be felt. But within fifteen minutes a distinct aconite sensation, not amounting to tingling, but very suggestive of it, will be felt and will continue for a quarter or half an hour in greater or less degree. The sensation though distinct, is not pronounced, and if the attention was



taken by other matters it would escape unnoticed. Any good fluid extract of aconite root should stand this test. When one is met with which does not stand it, it may be systematically diluted to a lesser degree until the sensation is reached, and then the amount of dilution will approximately measure its shortage in strength. Negative results being obtained, the second trial should be with one-fourth or one-third of a minim to the fluidrachm, and then a less or a greater dilution from the indications thus obtained. This is the principle adopted for the comparison of all the preparations of aconite and for aconitia, which are now to follow. It was found by repeated trials upon three individuals that such a fluid extract when diluted in the proportion of one-third of a minim to the fluidrachm, or 1 part in 180, when used in doses of a fluidrachm, gave a pronounced impression which commenced in about 5 to 10 minutes, increased for three quarters of an hour, and was practically at an end in 1.5 hour. This made a very convenient dilution for comparison, and was therefore adopted as the general standard for comparison.

Powdered aconite leaf with all the sensible properties of a good article was obtained from a good source, and was carefully made into a fluid extract representing the powder in the proportion of minim for grain, the same menstruum being used as for the root, namely, stronger alcohol. The dilutions of this had a mawkish as well as a bitter taste, were slow in producing their impression, and the impression made was different in kind from that of the root, and getting into the throat gave a greater sense of constriction and desire to swallow repeatedly. The fluid extract being much more loaded with chlorophyll and albumenoid matters than that of the root it would naturally act upon the mucous surfaces more slowly, and with a somewhat diminished activity for the same strength of active principle. Making a fair allowance for this, the comparison of the fluid extracts showed that three minims of that from the leaf was about equal to one-third of a minim of that from the root. This makes the strength of the leaf to the root as measured in this way as 9 to 1, or makes the root nine times stronger than the leaf. This was very unexpected, and therefore the trials were repeated on different persons, and the conditions of the trial were carefully re-examined, but the results being tolerably uniform were accepted.

Then, if these results are trustworthy, the ordinary dose of the fluid

extract of the root being one minim, the equivalent dose of the fluid extract of the leaf would be nine minims, and this is probably the proper relation.

Next 100 cc., equal to 1,623 minims of the fluid extract of aconite root, which is equal to 1,623 grains of the powdered root, and weighs 88 grams, was evaporated to the condition of a solid extract of which it yielded 15 grams, or about 232 grains. This, calculated upon the powder represented, is 14.3 per cent. From this it is shown that the dose of the solid extract of aconite root which corresponds to one minim of the fluid extract and to one grain of the powder is, .143 grain, or a little over an eighth ( $\frac{1}{125}$ ) of a grain, provided there be no loss of activity in the evaporation. But that there always is such a loss is well known, so that the equivalent dose is really greater in proportion to this loss. The U. S. Dispensatory gives the dose of this extract as one-sixth to one-quarter of a grain three times a day. The National Dispensatory gives one-sixth to one-third of a grain, and thus neither are out of the way.

Then 100 cc. equal 1,623 minims of the fluid extract of the dried leaf, equal to 1,623 grains of the powdered leaf, and weighing 86.8 grams, was evaporated to the condition of a solid extract, of which it gave 15 grams, or 232 grains, or 14.3 pc. of the weight of the powder.

Now, if the dose of the extract of the root be one-sixth to one-quarter of a grain, the equivalent dose of this extract of the dried leaf would be nine-sixths to nine-quarters of a grain, or one and a half to two and a quarter grains. This is a somewhat stronger preparation than the officinal "*Extractum Aconiti*" of the U. S. P., and the U. S. Dispensatory gives the dose of the officinal extract as "half a grain or a grain to be gradually increased if necessary," and the National Dispensatory gives the same dosage. This, as will be seen, is just about one-third of the proper dose equivalent to the dose they give of the extract of the root, and would doubtless be proportionately inefficient.

The British Pharmacopœia extract of the "Fresh Leaves and Flowering Tops of Aconite" cannot be compared with the above for want of proper data. The U. S. Dispensatory gives the dose of this preparation as one or two grains night and morning, and says that as much as twenty grains or more have been given in the course of a day. The National Dispensatory gives the dose as half a grain to a

grain. A pot of English extract labeled "Extractum Aconite, manufactured by George Allen & Co.," the word "leaves" being written on the wrapper in pencil, was bought for trial. This is supposed to be the officinal extract of the British Pharmacopœia. The appearance of the extract is good, and it is of proper pilular consistence. On careful comparison, a half grain of this extract dissolved in a fluidrachm of water was just about equal in effect to half a minim of the standard fluid extract of the root in the same quantity of water. So also the tenth of a grain of it gave about the same impression as the tenth of a minim of the fluid extract. The stated dose of the U. S. Dispensatory for this extract is, therefore, not far from correct, while the dose given in the National Dispensatory is one-half too small.

The next preparation still not uncommonly used is a tincture of the leaf, and when "tincture of aconite" is written or asked for, this is the preparation that is always dispensed by the careful pharmacist, though in most cases it is probably not what the physician wants. There is no authorized formula for this tincture in the principal pharmacopœias, it having been dismissed from them all. In the U. S. Pharmacopœia of 1860 the tincture is directed to be made of the strength of 2 troyounces to the pint. This is 8 minims of tincture to each grain of powdered leaf. And as the root is nine times stronger than the leaf, the 8 minims of this tincture would be represented by one-ninth of a grain of the powdered root or one-ninth of a minim of the standard fluid extract of the root. Then, as a minim of this fluid extract is the standard dose, the equivalent dose of this tincture of the leaf would be ( $9 \times 8 =$ ) 72 minims, or 1·2 fluidrachm. This completes the commonly-known preparations of the leaf.

Of the preparations of the root, the powder, fluid extract and extract have been considered. The four tinctures of aconite root in common use are, first, that of the U. S. Pharmacopœia, which is 6 troyounces to the pint. This is 2·66 minims of the tincture to 1 grain of powdered root or 1 minim of fluid extract of the root.

Second. The tincture of the British Pharmacopœia, which is  $2\frac{1}{2}$  avoirdupois ounces of powdered root to 1 imperial pint. This is ( $437\cdot5$  grs.  $\times 2\cdot5 =$ ) 1,093·75 grains of powdered root in 9,218 minims of the tincture, or about 8·434 minims of the tincture to 1 grain of the powdered root, or 1 minim of fluid extract of the root.

The tincture of the German Pharmacopœia is 1 part by weight of the comminuted root to 10 parts by weight of diluted alcohol, s. g. ·892.

Diluted alcohol of .892 s. g. weighs 6,506 grains to the pint of 7,680 minims. Therefore this tincture would be made from 650.6 grains of the powdered root to 6,506 grains of the diluted alcohol, and the product would be 7,680 minims of the tincture. Then each grain of the powdered root would be represented by  $(7,680 \div 560.6) = 11.8$  minims of the tincture.

Fleming's tincture of aconite root, as given in the U. S. Dispensatory, page 1492, foot-note, is made so that 16 troyounces of powdered root is nearly represented by 24 fluidounces of the tincture, which is in the proportion of 1.5 minim of the tincture to 1 grain of the powdered root or 1 minim of the fluid extract.

Compactly stated, the approximate equivalency is as follows: 1 grain = 65 milligrams of powdered aconite root of good quality, equal to 1 minim = .0616 cc. of well-made fluid extract of the root is represented in

Alcoholic extract of aconite root, by	$\frac{1}{2}$ grain	=	11 milligrams.
U. S. P. tincture	" " 2.66 minims	=	.164 cubic centimeter.
Br. P.	" " 8.434 "	=	.520 " "
German P.	" " 11.8 "	=	.727 " "
Fleming's	" " 1.5 "	=	.0924 " "
Powdered aconite leaf, . . . . .	9 grains	=	.583 gram.
Fluid extract of aconite leaf, . . . . .	9 minims	=	.554 cubic centimeter.
Alcoholic extract of dried aconite leaf, . . . . .	1.5 grain	=	99 milligrams.
English extract of fresh plant, Allen's, . . . . .	1 grain	=	65 "
Tincture of aconite leaf, . . . . .	.72 minims	=	4.44 c. centimeters.

Therefore, if one minim of the fluid extract be the commencing dose, the columns represent the equivalent doses of all these preparations, provided the preparations be properly made from good material.

The same physiological test was applied to the four aconitias which are commonly used in this market, and the same standard was adopted in judging of their relative strength, namely, 1 minim of fluid extract of aconite root equal to 1 grain of powdered root. As before, the fluid extract was so diluted that each fluidrachm, or 3.7 cc., represented  $\frac{1}{3}$  of a minim of the fluid extract, and a fluidrachm of this dilution was used for each trial, this being the quantity which gave a full, strong impression, the duration of which was about an hour and a half. The quantities of aconitia were all dissolved in this same quantity of water, and the impressions made were compared both in intensity and in duration by repeated trials. The primary solutions of the aconitias

were at first made by dissolving 1 grain, equal to 65 milligrams of the aconitia, in 50 cc. of water. In using these solutions it was discovered that they deteriorated very rapidly, and diminished in strength after the second day. In four days, the weather being very warm, they were quite inert, giving no impression at all. Floating shreds of mycelium were noticeable at times on the second day. The dilutions of fluid extract became inert quite as quickly as those of the aconitias, and it was very striking to observe that a dilution which would give a distinct impression one day might give none whatever on the next. The growth of the cryptograms appears to be a measure and the cause of the decomposition. Hence the indication is very plain that in the use of all such solutions for medicinal purposes, as well as for testing, they should be freshly made every day, or at most every two days, unless something be added to preserve them.

The best and almost the only definite authority found for the proportion of aconitia in aconite root was C. R. Alder Wright, D. Sc., Lond., whose investigations of the alkaloids of aconite were very thorough. In a paper contributed to the British Phar. Conference, and published in the "Year-Book of Pharmacy" for 1876, at p. 539, this author states that he obtained .03 per cent. of pure aconitia from the root and 0.07 per cent. of total alkaloids, crystalline and non crystalline. He states the probability that upon a larger manufacturing scale, where the mother-liquors could be carried along to a better exhaustion, the yield might be increased to .04 per cent. of pure aconitia. It may, however, be inferred from what he says that there is a considerable loss from splitting up of the aconitia into other bases, even from the best process of extraction, namely, that of Duquesnel, and it may be possible that all the bases existed in the root as aconitia. For the purposes of this paper this possibility will be assumed, and .07 per cent. will be accepted as the proportion of aconitia in good root, although this is about double the quantity really obtained in working 224 lbs. of the root.

Upon this assumed strength of root, one grain of the powder, or its liquid equivalent, one minim of fluid extract, will contain seven ten-thousandths of a grain of aconitia (.0007). Then, as one-tenth of a minim of the fluid extract gives a distinct aconite impression in the mouth, it follows that a tenth of seven ten-thousandths of the alkaloid, or seven hundred thousandths (.00007) of a grain of good aconitia should give an equivalent impression. But, as will be seen hereafter,



this is so very far from being the case as to be outside of all probability of either error in calculation or error in degree of impression made.

The standard dilution for comparison adopted here is one-third of a minim of fluid extract diluted to one fluidrachm, and this, by the assumption of 0.07 per cent. of aconitia in the root, is equivalent to, or should contain  $\cdot00023 +$  grain, or say, for simplicity of expression, three ten-thousandths ( $\cdot0003$ ) of a grain. Then it follows that a fluidrachm or 3.7 cc. of water containing 0.0003 grain of pure aconitia should give a distinct full impression in the mouth of the duration of about 1.5 hour, which is very far from being the case, even with the strongest aconitia.

The following varieties of aconitia of the market were tried with the results stated:

There is no maker of aconitia in this country known to the writer. The first aconitia tried bears the label of a well-known manufacturing house of this country, but it is believed that they buy what in their judgment is the best they can get in Europe, and then put it forth with their own label. Unfortunately this is the aconitia which the writer has been ignorantly buying and using for more than a year past to make oleate of aconitia, and consequently the oleate has been proportionately worthless. Two grains =  $\cdot130$  gramme of this aconitia was dissolved in 50 cc. of distilled water, acidulated with  $\cdot2$  cc. of acetic acid. The trials were commenced by taking  $1 \text{ cc.} = \frac{1}{25}$  of a grain of aconitia, diluting it with distilled water to 1 fluidrachm = 3.7 cc., and, under the conditions before described, holding it in the mouth for one minute. No impression was obtained until the dose reached 4 cc. =  $\frac{1}{6}$  of a grain, and then the impression was hardly stronger than that from one-tenth of a minim of the fluid extract, and certainly no stronger than that from one-sixth of a minim of fluid extract. Therefore, this aconitia, costing \$14 per ounce, is but just the aconite strength of a well-made fluid extract. Its solution, however, was so very bitter as to show that one or more other alkaloids were present, and it is possible that it mainly consists of a decomposition product named by Wright "pieraconitine," from its bitterness. (See "Year-Book of Pharmacy" for 1877, p. 466.) This aconitia would have been tested farther but that the bitterness caused such a flow of saliva as to change the conditions of the trial.

The next variety of aconitia tried was that of Merck, of Darm-



stadt, the parcel used having been obtained from a trustworthy source here. The solution was made of double the strength of the last, namely,  $\frac{1}{50}$  of a grain = 1.3 milligram to each cc. Of this solution 2 cc. gave an impression similar, but not stronger than that from one-third of a minim of the fluid extract, and, therefore, 6 cc. =  $\frac{6}{50} = \frac{3}{25}$  grain of the aconitia was the equivalent to one minim of fluid extract, or it was found to be about eight times stronger than the first aconitia. Its solution was bitter, but not nearly so bitter as that of the first; and it required .12 grain of it to give the impression made by .0007 grain of the aconitia as present by calculation in one minim of the fluid extract.

The next variety tried was also made by Merck, and was labeled "From Himalaya Root." This, if from the *A. ferox*, as is probable, would be called by authors on this subject not aconitin, but "pseudaconitin," which is considered to be a different alkaloid. The solution of this for testing was made double the strength of the last, namely half a grain to 50 cc. of water and .2 cc. of acetic acid, so that each cc. of the solution represented .01 grain or 65 milligrams. Of this solution one-tenth of a cubic centimetre (.1 cc.) represented one-thousandth (.001 grain) of a grain, and this quantity in one fluidrachm of water gave an impression that was very difficult to detect. With .2 cc. in the same dilution the impression was decided and continued for an hour or more. With .4 cc. the impression was about equal to .33 minim of the fluid extract, and therefore (.4 cc.  $\times$  3 =) 1.2 cc. was about equivalent to (.33m  $\times$  3 =) 1 minim of fluid extract. Therefore .012 grain of this pseudaconitin is equivalent in physiological impression on the mouth to 1 minim of fluid extract. But the impression from this was different in kind from all the others, having less tingling and somewhat more of a peppery heat in it. It came on later than the others for the same degree of impression, increased and decreased more slowly, and was of longer duration. As .012 grain was equal to 1 grain of powdered root, and as this latter contains about .0007 grain of aconitia, it follows that the alkaloid in its natural condition in the root is much more powerful than when separated. It is just about ten times stronger than the last aconitia, or the ordinary aconitin of Merck.

The next variety tried—and the last—was that of Duquesnel, labeled "Aconitine Cristallisée, H. Duquesnel." This is in distinct crystalline form, while the others appear to be amorphous, and is quite

colorless, while the others are nearly white, excepting that from the Himalaya root, which is decidedly yellowish, and gives a solution of a yellow tinge.

The aconitia of Duquesnel was soluble in water, and the solution for testing was therefore made without acid, and like the last of the strength of half a grain, or 32.5 milligrams to 50 cc. of water. Therefore each cubic centimeter of the solution represented one hundredth of a grain, or .65 gram, and each tenth of a cubic centimeter represented one thousandth of a grain, or .065 milligram, and this latter quantity diluted to one fluidrachm with water gave a distinct though feeble impression in the mouth, generally at the tip of the tongue, going off in a quarter or half an hour. A dose of .3 cc. = .003 grain, or .195 milligram gave an impression just about equal to that from one-third of a minim of fluid extract. Therefore .009 grain was equal to one minim of fluid extract, or one grain of powdered root. But the one grain of powdered root contains only .0007 grain of aconitia, and yet nearly thirteen times as much of this aconitia of Duquesnel is required to make the same impression on the mouth.

Aconite root should yield about nine-tenths of one per cent. of aconitia in order to be in physiological equivalency with this aconitia of Duquesnel, but it really yields only about seven hundredths of one per cent. at the most, or about one-thirteenth as much.

This want of accordance in strength between the root itself, or the aconitia as it exists in the root in its natural condition, and this strongest of all the aconitias, is very remarkable and is inexplicable, but it certainly shows that there is great therapeutic as well as pecuniary economy in the use of the powdered root or its fluid equivalent, while the difference in strength between these aconitias shows that accuracy in dosage and in medication is altogether in favor of the root.

The impression made on the mouth by this aconitia of Duquesnel is very different from that of either of the other aconitias, and from that of the root. It is a more simple or less complex sensation, and seems to be the tingling element which exists in a less degree in all the others, and least of all perhaps in the pseudaconitia, which is farthest from this in the kind of sensation. The impression from the Duquesnel aconitia begins promptly—almost at once—while that from the pseudaconitia is delayed to five or ten minutes. The impression increases rapidly and is strongest about the tip of the tongue, has but a short

period of maximum impression, diminishes rapidly, and from small doses is very soon over. That from pseudaconitia increases slowly, is felt of nearly equal strength all over the surfaces of contact, has a long period of maximum degree, and diminishes so slowly that from a standard dose no more than two trials can be made in a day. The impression from the fluid extract and from the other aconitias is pretty plainly a mixture of the impressions from pseudaconitia and the aconitia of Duquesnel.

The relative strength of these four aconitias, as deduced from these trials, and as compared with one grain of the powder of good aconite root (German) is as follows:

Aconitia of unknown make,	1	grain = 65 milligrams = 1 grain of powder.
" Merck, ordinary,	$\frac{1}{8}$	" = 8 " = 1 " "
" " pseudaconitia,	$\frac{1}{83}$	" = 78 " = 1 " "
" Duquesnel,	$\frac{1}{111}$	" = 59 " = 1 " "

The relative strengths, therefore, are, 1 : 8 : 83 : 111. That is, the second is eight times stronger than the first; the third is ten times stronger than the second, and eighty-three times stronger than the first; the fourth is one-third stronger than the third, fourteen times stronger than the second, and one hundred and eleven times stronger than the first.

The doses of aconitia quoted in the United States Dispensatory are from the  $\frac{1}{330}$  to the  $\frac{1}{333}$  of a grain three or four times a day.

The National Dispensatory says that in view of the varying strength of aconitias the primary dose should not exceed the  $\frac{1}{256}$  of a grain two or three times a day.

In a report by Dr. E. C. Seguin on the use of Duquesnel's aconitia in trigeminal neuralgia his dosage varied between  $\frac{1}{96}$  and  $\frac{1}{140}$  of a grain three, four and six times a day, according to circumstances.

As other authorities vary as much as those above quoted, it is evident that the confusion here is quite as great as in the preparations of the leaf and root.

In the use of aconitia for medical purposes it would seem to be essential that it should first be tested, and as this physiological test is simple and easy and within the reach of all, it seems better adapted to general use than chemical testing, and two or three graduated pipettes will enable any one to apply the test. No aconitia should be accepted which will not give a distinct impression from  $\frac{1}{800}$  of a grain, or .08 milligram diluted to the measure of one fluidrachm or 3.7 cc.

This is not too high a standard, for the reason that the aconitia of Duquesnel will give the impression from  $\frac{1}{1000}$  of a grain or .065 milligram. The dose of such aconitia to begin with need not be smaller than  $\frac{1}{100}$  of a grain, or .65 milligram, three times a day, given in solution diluted to four fluidrachms or 15 cc., and always on an empty stomach. Should no effect be obtained within 24 hours the intervals between the dose should be shortened, first to 4 hours, then to 3, before the dose is increased. If the commencing dose be  $\frac{1}{200}$  of a grain the first intervals should be shorter, say every 3 hours. The solution should be swallowed with as little contact with the mouth as practicable if the sensation there is to be avoided. But if used for trigeminal neuralgia the mouth impression should certainly not be avoided, but should rather be sought for and be made as strong as possible.

For external use there is probably no form better or more convenient than an oleate of aconitia, made by dissolving two grains, or 130 milligrams in 98 grains of oleic acid. A fluidounce of oleic acid weighing 412 grains requires 8.25 grains of aconitia to make a 2 per cent. solution. Each minim of this oleate contains .0172 of a grain, or about  $\frac{1}{60}$  of a grain, and this quantity applied locally and repeated according to circumstances should be an efficient dosage, and should in a short time produce constitutional effects by its absorption. It should be applied to the surface by the cork of the vial, or by some non-absorbent, without friction, and about the head and face needs no covering; and great care must be taken that it does not get into the eye. In using it around the eyes this caution must never be forgotten. If applied under the clothing it should be covered with oiled silk or rubber tissue. Local neuralgias are much better reached by the dermic or epidermic method of treatment.

One hundred drops of the oleate make a fluidrachm when dropped from an ordinary half ounce vial, thus making a little more than 1.5 drop to the minim. One drop spread by a pin or by the cork of the vial will easily cover a square inch of surface without spreading much further afterward, and in ordinary conditions of the healthy skin will be absorbed within a quarter of an hour, so that the dose may be repeated on the same place.

As a general result of these trials the conclusion can hardly be avoided that a well-made fluid extract of aconite root, made by reper-

colation with alcohol alone from good root, is the best and only preparation needed. It is accurate and uniform and easy to manage accurately in dosage, and is relatively the strongest of all the known forms in which the drug can be used. For these and many other reasons it should take the place of all the other preparations, and perhaps also that of all the aconitias.

Each parcel of it as bought by the pharmacist or the physician should be tested, and if one-tenth of a minim of it diluted with a fluidrachm of water and held in the mouth for one minute does not give the aconite impression within ten minutes, the parcel should be rejected, or its strength should be obtained, and doses increased accordingly.

That is, if double this quantity in the same dilution should be required to give the slight but distinct impression, then the dose should be doubled.

It is best used at the bedside in the following way: A household teaspoon is called for, and ten teaspoonfuls of water are measured with it into a wine-glass or small cup. Then ten minims of the fluid extract are added from a minim pipette, and the mixture is well stirred. A teaspoonful of this represents a minim of the fluid extract, if measured with the same spoon, and this dose, if not given oftener than every three hours, will about use up the mixture in the 24 hours, until the next visit, when a fresh mixture should be made, and the dosage varied according to circumstances. The teaspoonful dose should be put in a wine glass, and about two teaspoonfuls of water added before swallowing, to avoid too strong an impression upon the fauces. A mouthful of water immediately after the dose is also useful in moderating the local impression.

The fluid extract may also be efficiently used externally by allowing successive drops to evaporate from any surface until the desired dose is reached, and then keeping the surface moist, that absorption may take place.

This fluid extract, when of good quality, is an exceedingly potent preparation, and so dangerous that extreme caution is needed, not only in its use, but also to prevent accidents and mistakes. In prescriptions the full title, "Fluid Extract of Aconite Root," should always be used.



## SOME RESULTS OF THE ACTION OF THE DIGESTIVE FERMENTS UPON DRUGS.

BY GEORGE BROWNEN, F.C.S.

*Read before the British Pharmaceutical Conference.*

I purpose in this paper to call the attention of this conference to some of the results of the action of solutions of the digestive ferments upon medicinal substances.

Preparations containing the gastric and pancreatic ferments have recently become famous as dietetic auxiliaries; I need not, therefore, occupy time with references to peptonized foods or drinks, or even give a detailed account of their discovery and development.

In 1836 Schwann applied the term pepsin to an albumen-dissolving product obtained from the gastric juice, and subsequent investigations seem to show that the gastric juice contains more than one distinct ferment, or that this ferment may be modified by the process of extraction, so as to assume new or lose some of its original properties.

This is also true of the ferment or ferments of the pancreas. Bouchardat, in 1845, and Claude Bernard, a few years later, discovered or described some of the properties of the pancreatic secretion. In 1862, Danilewsky asserted the existence of three special ferments in the pancreatic juice, and since that time Von Wittich, Kuhne, and others have extracted and examined the ferments and applied them to dietetic purposes.

But there is a field of research outside the range of the peptonized foods which merits the attention of the pharmacist and the physiologist. It is this, what are the possible modifications which drugs may undergo in contact with the digestive secretions, and will an examination of such results be of service in the preparation, combination or preservation of crude material so as to secure the best physiological results?

Solutions of the gastric ferment were obtained from the stomach of the pig, by means of dilute glycerin and also with acidulated water and alcohol. Pancreatic solutions were also obtained from the pancreas of the pig by means of glycerin and a feeble alkaline, as well as an acidulated dilute alcohol. The first series of experiments were made with these solutions and crude drugs; the second with the definite principles.

An infusion of rhubarb, half ounce to the pint of water, was pre-

pared, and as soon as the infusion had cooled to 50°C., some of the acid solution of pepsin was added and the temperature maintained by means of the incubator for two hours; 47 per cent. of the rhubarb was thus rendered soluble. The mixture was then neutralized by sodium carbonate, the alkaline solution of pancreatin added, and the temperature sustained for two hours longer. The insoluble portion was then found to consist of cellulose and earthy salts, retaining a small quantity of coloring matter. The 240 grains of rhubarb left an insoluble residue of 96 grains.

Infusion of calumba, prepared with boiling water, and passed through the same processes of digestion, gave somewhat similar results. The spongy cellulose was associated with a trace of berberia; 500 grains of calumba left an insoluble residue of 172 grains.

Cinchona and opium, upon the other hand, behaved somewhat differently; the gummy and extractive matters were dissolved and retained in solution, but a considerable portion of the alkaloids was left in the insoluble marc. Cinchona was about half soluble (48 per cent.), and opium about two-thirds, or 68 per cent. Quinine and morphia could be detected in the respective solutions and were also readily found and extracted from the insoluble residues. The cinchona tannin was destroyed in the digestive process and failed to precipitate gelatin, but this peculiarity will be noticed when we come to the action upon definite substances.

The possibility of the digestive ferments attacking gum acacia was deemed of some importance, in consequence of gum being used in a test demonstrating the acidification of fat by the emulsive ferment of the pancreas. Strong solutions of white gum arabic were therefore prepared and submitted in the incubator to the action of the gastric and pancreatic solutions. The feebly acid solution containing the gastric ferment remained clear even after several hours' digestion. A slight change, however, had occurred in the mixture, as a portion removed, neutralized with soda and boiled with Fehling's sugar test, showed a slight reduction to cuprous oxide, whereas a portion of the original solution undigested, but kept at the same temperature and under similar conditions, was not affected by the glucose test.

The mucilage digested with the alkaline pancreatin solution soon became cloudy, and ultimately a white precipitate was formed. The mixture seemed less viscid than that containing the gastric ferment, and a portion of the solution gave the violet reaction of peptone. The

precipitate was found to consist of calcium carbonate, with a considerable quantity of the diastatic ferment carried down by the precipitated chalk. This precipitate, carefully washed, was found to possess strong amylolytic but no proteolytic or emulsifactive power.

I should, therefore, think that the arabin of gum acacia remained unaffected by the processes, and that the peptonizing change was wrought upon some slight impurity of gum, possibly containing nitrogen; this point, however, is reserved for further investigation.

Closely allied in physical character to gum, and holding an intermediate place between foods and medicines, are the mucilages obtained from Irish and Iceland moss. On Irish moss the alkaline extract of the pancreas seemed to exert very little action. The proteolytic ferment of the pancreas extracted with acids soon destroyed the viscosity of the mucilage, and divided the jelly into soluble and insoluble portions. These results were also obtained by the digestion of chondrus jelly with solution of pepsin; the products resembled and perhaps were identical with parapectin and pectic acid.

Cetraria, or Iceland moss, behaved somewhat differently. A jelly of this substance retained its color, but became flocculent when acted upon by the gastric ferment. On the other hand, the pancreatized jelly retained more of its viscosity, became deeper colored, and gave a deposit of yellowish-white flakes. These flakes under the microscope were found to consist of noncrystalline masses (pectic acid?).

The digestives were found to produce or accelerate the pectic fermentation by some experiments upon the pectin of the turnip.

I must now leave the consideration of this part of my subject and call your attention to the action of the ferments upon more definite substances. The acidulated extract of the gastric juice decomposed a watery solution of salicin very slowly and imperfectly; saliretin was formed, but it was associated with undecomposed salicin. On the other hand, the pancreatic ferment split up the salicin into saligenin and glucose, and the saligenin separated by solution in ether and subsequent crystallization was obtained in the form of white laminae or scales.

A well-washed sample of jalapin remained intact after digestion with the pepsin solution, but pancreatic digestion withdrew a copper-reducing substance from the jalapin.

Santonin was unaffected by gastric and pancreatic solutions.

A solution of tannin treated with the acid pepsin solution became

turbid, but the turbidity disappeared when a little more hydrochloric acid was added to the mixture. The results of several hours' digestion were, however, negative, but the pancreatic ferment, upon the other hand, rendered the tannic acid incapable of precipitating gelatin or isinglass, because of the transformation into gallic acid.

These are a few of the results obtained by digesting drugs with extracts from the digestive organs; they throw open a wide field for the pharmacist, and one deeply interesting to the physiologist.

The digestive process seems to consist of the hydration or splitting up of insolubles, and, as far as my observation has gone, the microzymous or bacteroidal fermentation need not occur until the primary digestion is in an advanced stage. For instance, in the digestion of the proteids, albumen and fibrin, I have noticed occasionally a point when the solution or hydration of these substances by the acidulated pancreatic secretion passes into the formation of leucin and tyrosin. I refer to the acidulated pancreatic solution, as the researches of Dr. Roberts and others upon the amylolytic power of a neutral or feebly alkaline pancreatic extract have seemed to throw into the shade the proteolytic power of acidified pancreatic juice, which, although incapable of transforming starch paste into sugar and dextrine, yet still possesses the power of dissolving fibrine or albumen, and ultimately splitting them up into leucin, tyrosin, and an organic acid. This is not the result of the putrid fermentation of albuminous bodies, as in this latter case the formation of ammonia renders the reaction alkaline instead of acidulous.

The emulsive ferment as well as the proteolytic inaction produces acidity, although in the emulsification of fat the acidity is generally very slight and insufficient by itself to account for the minute subdivision of large portions of fat. In the digestion of proteids the acidulous body is glutamic acid, and I think it may also occur in the emulsification of fats, as I have often sought for fatty acid and glycerin as separate bodies in emulsified fats; but I have always failed in my attempts to obtain any proportionate quantity which would justify me in ascribing emulsification of fat to their formation and presence.—*Phar. Jour. and Transactions.*

---

**Compound Cathartic Pills.**—The following slight change in the formula for *Compound Cathartic Pills*, U. S., is strongly recom-





instruments of life—may be considered possible and even probable, as well as the precise definition of their specific constituents.

Although these matters do not crystallize or volatilize or form well-defined combinations with bases or acids, they possess one character which is constant and distinctive, and that is the action that bodies of this nature exercise upon the plane of polarized light. In studying various albumenoid matters under this aspect M. Béchamp has succeeded in separating them into species which, if not absolutely defined and comparable to those represented by volatile or crystallizable substances, at least present the results of the first serious attempt towards a regular classification of these interesting products.

In order to appreciate the importance of this inquiry it is sufficient to recall the fact that the organs of all animals and the liquids bathing them are formed of or contain such matters, and that if they do not constitute the preponderating materials in the tissues and juices of plants, their presence in them does not seem to be less general or less essential, especially at the commencement of cell formation. If it be added that analyses of these substances and their interpretation have led chemists to admit that their molecule contains not less than from five to six hundred atoms of carbon, hydrogen, oxygen, or nitrogen, it will be understood what a distance separates these bodies from those much less complex ones, the study of which has served as a foundation for the doctrines upon which systematic organic chemistry rests.

The first question to resolve in connection with this group of bodies consists in breaking up the mixtures in which they occur in nature and isolating those individuals possessing fixed and sufficiently fundamental properties to warrant their being considered specific and essential.

White of egg contains at least three bodies: one precipitable by subacetate of lead; a second by ammoniacal subacetate of lead; and a third which is not coagulable by heat, and is soluble in water and insoluble in alcohol, by which means it is separable from an aqueous solution. The first two of these substances present the general character of albuminoid matters; the third belongs to the class of ferments and liquefies starch.

The ferment discovered in the white of egg by M. Béchamp explains some of the phenomena which occur during incubation. Its presence there caused him to look for it in other albuminoid products, and a general idea of his work may be given by saying that he has suc-

ceeded in breaking those up into two or three distinct substances, possessing the properties of albuminous products, and a well-defined ferment. The question arises, for what purpose are all these albuminous liquids accompanied by these ferments? What relation exists between the abundance of coagulable animal matter, destined apparently to furnish materials for the building up of organs, and the small quantity of these ferments the presence of which appears to indicate the approaching destruction of the unstable compounds with which they are associated? Whence do these ferments come, what becomes of them, and what part do they play? Such questions are certainly of considerable interest; for these ferments are observed in the serum of the blood of all animals, in the white and the yolk of eggs, and in milk; that is, in all liquids destined for the formation or reparation of the organs of animals.

Long ago Thenard, recognizing the singularly destructive action exercised upon peroxide of hydrogen by certain bodies, such as divided silver, was led to compare their manner of action in this case with that of ferments. In fact, the analogy is striking between beer yeast, which in the presence of sugar destroys it and converts it into alcohol and carbonic acid, and fibrin, which converts peroxide of hydrogen into oxygen and water. Neither beer yeast nor fibrin appears to operate in virtue of a chemical action, or it would have a part to play. But yeast operates in virtue of a vital phenomenon: would this be the case with fibrin? Of this we are ignorant, and although our ideas upon the subject of ferments have been much modified since the investigation of peroxide of hydrogen by Thenard, we are not yet in a position to explain how fibrin decomposes peroxide of hydrogen apparently without borrowing anything from it or yielding anything to it.

This question, the interest of which has not escaped physiologists, has been advanced a step by M. Béchamp. The fibrin of the blood and the oxygen condensed in the globules may possibly have a part to play in the complex phenomena of respiration allied to this singular action upon peroxide of hydrogen which no other animal matter exhibits. M. Dumas states that he himself formerly sought unsuccessfully to ascertain whether arterial blood contained peroxide of hydrogen, but he would not be surprised if some more able experimenter were to detect its presence.

When fibrin is treated with dilute hydrochloric acid it swells and

the greater portion of it dissolves; but as recognized by M. Bouchardat there is always an insoluble residue. M. Béchamp has demonstrated that it is in this residue that the decomposing action in respect to peroxide of hydrogen is found and not in the soluble portion that is removed by hydrochloric acid.

The granular substance insoluble in hydrochloric acid is still an albumenoid matter, possessing the general properties of albumenoids. When heated to boiling in water it loses its decomposing power upon peroxide of hydrogen. If dried in a vacuum in the cold it, on the contrary, retains the power. The same happens when it is treated with alcohol and ether; a little fatty matter is removed without modifying its decomposing power. When this singular substance has been well prepared its action upon peroxide of hydrogen is as rapid as that of the metallic oxides.

It may be mentioned that in a subsequent communication to the Academy ("Comptes Rendus," xciv, 1382) Messrs. Bert and Regnard confirm M. Béchamp's statement that the power of decomposing peroxide of hydrogen resides in the portion of fibrin not dissolved in dilute hydrochloric acid. They further state that if fibrin be converted into peptone by artificial digestion it is no longer capable of decomposing peroxide of hydrogen, but that this property is not affected by putrefaction. Another observation of these experimenters that in every case an organized ferment, such as beer yeast, is immediately destroyed by contact with peroxide of hydrogen, whilst soluble ferments, such as diastase and the gastric and pancreatic juices, are not affected by it, may give a clue to the nature of the ferment associated with fibrin.

The memoir of M. Béchamp contains the results of his attempts to separate definite substances from various albumenoid matters, and enumerates the various ferments that he has found associated with them as well as their properties.—*Phar. Jour. and Trans.*, July 22, 1882; from *Journal de Pharmacie*.

---

## THE VOLATILE PRODUCTS OF PUTREFACTION.

BY DR. G. LE BON.

In a paper recently laid before the French Academy, the author states that as the result of his latest experiments on the antiseptic pro-

perties of the glyceroborates of sodium and calcium he comes to the following conclusions :

*First*—The disinfecting power of any antiseptic is in inverse ratio to the age of the putrefying material. A solution of chopped meat six days old will require a much smaller proportion of disinfectant than when it has been kept, say for a couple of months, when the amount required will be ten times greater.

*Secondly*—If we wish to measure the power of antiseptics by taking as a basis their disinfecting properties, when applied to a solution of chopped meat of normal strength (1 : 10), we shall find that the most powerful compounds are potassic permanganate, calcic hypochlorite, ferrous sulphate acidulated with acetic acid, carbolic acid and potassic and sodic glyceroborate. For instance, in order to disinfect 10 cubic centimeters of the normal chopped meat solution mentioned above we must take 500 cubic centimeters of a saturated solution of salicylic acid, 80 of a saturated solution of carbolic acid, 80 of a ten per cent. solution of sodic glyceroborate and several drops only of a one per cent. solution of potassic permanganate.

*Thirdly*—There is no parallelism in the disinfecting action of an antiseptic and its action on microbes; potassic permanganate, for instance, although a most powerful disinfectant, exercises no power whatever on these organisms. On the other hand, alcohol, which, after a long time, checks their development, only acts as a very weak disinfectant.

*Fourthly*—There is no parallelism between the power of an antiseptic in preventing putrefaction and its power of checking it when once set up. Alcohol and carbolic acid, which are powerful preventatives of putrefaction, act but feebly when putrefaction has once commenced. Carbolic acid, therefore, when used in surgery, acts rather as a preservative than as an antiseptic.

*Fifthly*—With the exception of a very small number of bodies, such as corrosive sublimate and other powerful poisons, the greater part of the antiseptics now in use, more especially carbolic acid, have but a very feeble action on bacteria. If we mix 20 cubic centimeters of the above-mentioned normal solution of chopped meat with 50 or even 100 cubic centimeters of a saturated solution of carbolic acid, the larger bacteria are rendered motionless, while the smaller ones retain their vitality and powers of reproduction. The author possesses carbolized solutions four months old still rich in bacteria. In

fact, so far from looking on carbolic acid as a destroyer of bacteria, the author looks on it as the best material for preserving their lives!

*Sixthly*—The experiments hitherto made upon the cadaveric alkaloids have not solved the question as to whether the odorous volatile alkaloids evolved during putrefaction are poisonous or not, seeing that the products of putrefaction introduced into the body in these experiments contain bacteria to which the resulting poisonous effects may or may not be attributed. After trying many experiments, the author simply introduced a number of frogs into a vessel the bottom of which was covered with a layer of the normal meat solution already mentioned. When putrefaction first set in, although large quantities of sulphuretted hydrogen and other fetid products were evolved and the liquid swarmed with bacteria, the frogs did not seem to suffer in the slightest degree, although, had an infinitesimal portion of the liquid been injected into an elephant, the animal would infallibly be poisoned. The same liquid kept for two months and then being harmless when injected subcutaneously, killed the frogs in a few minutes when they were compelled to breathe its vapor. There is, therefore, no parallelism between the toxic properties of a putrefying liquid and of its emanations. On the contrary, they seem to be in inverse ratio; that is to say, the newer the liquid the more toxic it is, the older the liquid the more toxic are its exhalations.

*Seventhly*—The small quantity of these volatile toxic alkaloids, which is sufficient to kill animal life when breathed, shows them to rival nicotine, prussic acid and other powerful poisons in their virulence.

*Eighthly*—The author's experiments show why accidents have arisen when bodies have been exhumed after having been buried for a long time. The air of old cemeteries, although nearly free from microbes, is, nevertheless, extremely poisonous. The volatile products of putrefaction generated by microbes appear, therefore, to play an important part in contagious and infectious diseases.—*The Chemists' Journal*, from *Comptes Rendus*.

---

## VARIETIES.

---

**OLEATES IN THE DERMATOSES.**—Dr. Shoemaker read a paper at the recent meeting of the Pennsylvania State Medical Society, in which he claimed the following advantages for the oleates over ordinary ointments:



First: Their deep penetration. The oleic acid gives them active ability to penetrate rapidly into the animal economy, and renders any salt with which it is combined more active and effective in dermic medication. Second: Their freedom from rancidity. Third: Their cleanliness of application. Fourth: Their great economy. Fifth: Their antiseptic action. Oleate of zinc is of great value in hyperidrosis and osmedrosis and eczema vesiculosum. Oleate of copper is of great value in tinea. Oleate of alumina is of great value in checking muco-purulent discharges. Oleate of iron has a mild astringent action. Oleate of arsenic is of value in lupus and the ulcerating variety of epithelioma, and is better borne than other forms of arsenic. The surface must first be abraded, otherwise there is no result. Oleate of silver is of value as a local application in erysipelas, and when sprinkled over old chronic ulcers sets up a healthier state of the parts. It is of use in carbuncles and boils, and will often arrest pustulation in its earlier stages.—*Chicago Medical Review*, June 1.

THE PROPER DOSE OF CONIUM.—Seguin ("Archiv. of Medicine," April, 1882), commenting upon the dose of this agent (he employs the fluid extract, Squibb), says that to get any effect from it we must use much larger doses than are usually recommended. He says use it in chorea, spasm or paralyzed limbs, general irritability and insomnia. To obtain muscular relaxation, as in chorea, after a few tentative doses of 20 and 40 minims, he gives 60, 80 or even 100 minims, which cause ptosis (sometimes diplopia) and paresis of arms and legs. He does not repeat until the effects have passed off—12 to 24 hours. He has almost perfectly cured a chronic adult chorea of 14 years' duration by teaspoonful doses daily for a month or more. Many cases of insomnia with wakefulness in the first part of the night, more especially those with fidgets or physical restlessness, are very much benefited by conium—m. xx with gr. xx bromide of potassium, to be repeated if necessary. The indications of conium can only be fulfilled by obtaining its physiological effects, between which and the toxic effects there is a wide difference.—*Md. Med. Jour.*; *South. Med. Record*.

BROMIDE OF POTASSIUM IN DIABETES.—The Paris correspondent of the "Medical Press" says: "Before the meeting of the Académie de Médecine a member read a paper on the treatment of diabetes by bromide of potassium. For the last six years the author has made this disease the object of his researches, and during that period he treated fifteen cases. He ignored entirely the classic *régime* of gluten bread, etc., being of the opinion that the disease consisted, not in the presence of sugar in the urine, but in the disorder of the organism, which produced the sugar in excess. Having had a patient that was diabetic, but who consulted him for certain nervous affections, he observed that under the influence of the bromide of potassium, of which he prescribed a drachm a day, the former disease yielded. Ever since, the author has entirely adopted this drug in the treatment of the disease in question, and always with good results. The author farther insists on the necessity of employing muscular exercise of every kind. Alkalies, iron, arsenic, quinine, according to indications, form part of the general treatment. One point worthy of remark in the communication is the complete disregard as to *régime*."—*Louisv. Med. News*, Oct. 28.

## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, October 17th, 1882.

In the absence of the President Mr. Wm. J. Jenks was called to the chair. The minutes of the last meeting were read and approved.

Professor Maisch presented the third volume of the Index Catalogue of the Library of the Surgeon General's Office, also a copy of the Report of the Ohio State Pharmaceutical Association.

The Registrar also presented a copy of the Report of the National Board of Health, a copy of the reports of the U. S. Naval Observatory on the Total Eclipses of July 29, 1878, and January 11, 1880, and Part Second of the Medical and Surgical History of the War of the Rebellion. This is also issued from the office of the Surgeon General. These were accepted and the thanks of the College returned.

Professor Maisch alluded to a paper which he read on *Chia* last April. Since that time he had grown several plants, one of which he exhibited; he had devoted some time in examining the plant, and would continue his investigation. For the present he would state that while it was doubtless a *salvia* it was neither *S. hispanica* nor *S. Columbaria*, and that it came nearer to *S. polystachya*, but in several respects differed from the descriptions given by Kunth and De Candolle. A dissected flower was exhibited under the microscope, and Prof. Maisch explained by sketches the manner in which fertilization by insects takes place in this plant, exhibiting also the handsome plate by Prof. Dodel-Port, illustrating the same process in *Salvia officinalis*. Prof. Maisch also stated that he had learned that flea seed, the seed of *Plantago Psyllium*, was sold as *Chia* seed in some parts of Texas.

Dr. A. W. Miller had been interested in this exposition of fertilization, and referred to a communication made some time ago to the Academy of Natural Sciences by Mr. Meehan, who, after vainly trying to raise from the fruit of the *wild carrot* plants having the characters of the cultivated carrot, concluded that possibly the purple central flower of the umbel might yield a different fruit; since this flower is always barren in this country, he had applied to the late Mr. Darwin and learned from him that in England it frequently produced fruit. It seemed therefore possible that from this fruit a somewhat different plant might be raised.

Prof. Maisch stated that in Germany the purple central flower of the carrot umbel was, as a rule, barren, the same as in this country. The variations observable in plants under cultivation and under the influence of different climates, soils, etc., were alluded to, resulting in the production of varieties having constant characters, and in the course of time of distinct species; thus the *German pellitory*, which is nowhere found wild, is now by some botanists regarded as a new annual form produced in cultivation during several centuries from the perennial *Anacyclus Pyrethrum*.

Dr. Miller considered this interesting, as it had a bearing on the subject of the development theory.

Specimens of *Cotoin* and *Para Cotoin* were presented to the Cabinet by Mr. Chas. Bullock, and were accepted with thanks.

On motion of Dr. Miller, Dr. Formad was invited to lecture at the next pharmaceutical meeting upon his researches on bacteria and upon the bacillus tuberculosis of Dr. Koch, of Berlin. It was also decided that the meeting be advertised on Saturday preceding the day of the meeting and on the day of the meeting, that the pharmacists and druggists of Philadelphia and Camden be notified by postal cards of Dr. Formad's lecture, and that those who desire similar notices in the future leave their names with the Actuary.

A specimen of *Citrine ointment* made from butter by Mr. Redsecker, of Lebanon, Pa., was exhibited; its fine color and consistence was remarked. In a note it was stated that in the store of G. Ross & Co. it had thus been made for over twenty years, and had always given satisfaction. Professor Maisch said that in a store where he was engaged in 1855 the ointment was made with butter, and retained its handsome color; but it became hard enough to be run into paper moulds and cut into square cakes, in which condition it was sold.

A specimen of *Fennel seed*, grown in Lancaster county, sent by Mr. Chas. A. Heinitsh, was exhibited; though smaller than some varieties of fennel, it was of excellent odor and appearance, yet, as Mr. Heinitsh stated, not quite equal to the product of other years.

A specimen of *Alexandria Senna* was shown, and Prof. Maisch stated that it was interesting from the total absence of stalks and of argel leaves, and from its consisting of leaflets of *Cassia acutifolia*, mixed with a very small proportion of small leaflets of *C. elongata*, and a minute proportion of those of *C. abovata*, the admixtures being too insignificant in quantity to regard them as having been intentionally made. Mr. Jenks said that it was a good quality of garbled Alexandria senna, and that in other similar lots he had never noticed the absence of argel leaves, nor the presence of the leaflets of the other species.

It was moved, and carried, that the meeting adjourn.

T. S. WIEGAND, Registrar.

---

## PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

---

THE COLLEGES.—In the beginning of October the lectures have commenced in all the Colleges of Pharmacy from the Atlantic to the Mississippi, and as far as heard from they appear to be well attended. The Philadelphia College has a larger class than during the preceding year. Improvements have been made during the past summer in the lighting and ventilation of the lecture rooms; the cabinet has been enlarged and the material for instruction has been considerably augmented, embracing not only typical and commercial specimens, but likewise apparatus, models, plates, lan-

tern-slides, etc. The auxiliary instruction has also been extended and improved. The work in the chemical laboratory, in charge of Prof. F. B. Power, has considerably increased. A goodly number of students have availed themselves of the facilities offered for individual study, and the class instruction for the senior students is meeting with encouraging success, while the more elementary course arranged for the juniors is not as well attended as it should be. The pharmaceutical laboratory, in charge of Prof. J. P. Remington, in which the hours for instruction have been doubled, as compared with previous years, is well filled so that some difficulty has been experienced for making suitable provisions for all applicants.

After several years' labor the Alumni Association has succeeded in making the necessary arrangements for practical instruction in the use of the microscope; a number of Zentmayer's instruments have been purchased and the instruction has been placed in charge of A. P. Brown, Ph.G., whose practical knowledge of microscopy and vegetable histology will be of great advantage in the more general introduction among the students of this College of the microscope as one of the important aids in study and research.

Chemical laboratories are at present in operation in all Colleges of Pharmacy, we believe. Of the organization of pharmaceutical laboratories outside of Philadelphia we have thus far been informed that it was done in St. Louis, though we are aware that the same has been and is in contemplation in several others.

---

THE ALUMNI ASSOCIATION OF THE PHILADELPHIA COLLEGE OF PHARMACY held its first social meeting on the afternoon of October 10th, and was addressed by Dr. Miller on the "Allurements of Pharmacy;" the speaker contended that without expensive advertisements and traveling salesmen, that absorb a large share of the profits of the wholesale druggist the legitimate business in pharmaceutical articles and druggists' sundries should be just as great as at present, and that the saving in expenses would result to the advantage of the retailer. In the discussion which followed attention was drawn to the fact that by reliable salesmen a business could be enlarged, new articles readily introduced, etc., and that without such means it would be difficult to obtain new customers as the older ones died or went out of business.

Mr. Sayre addressed the meeting on the "Use of Ammonia in Baking Powders," explained its action and that of other chemical mixtures, and contrasted this with the old-fashioned leavening.

Dr. Miller exhibited a specimen of crystals which had been obtained in the distillation of cedar shaving, and which may possibly be a stearopten. The attacks of "the press" on pharmacists and some points in relation to urinary analysis formed further subjects for discussion.

---

THE ILLINOIS PHARMACEUTICAL ASSOCIATION held its third annual meeting in the armory of the First Regiment, in Chicago, October 10th, 11th, and 12th. The chair was occupied by President Bourscheidt; the

Secretary's desk by T. H. Patterson. Addresses of welcome were made by City Engineer Cregier, on behalf the Mayor, and by Lieutenant-Governor Hamilton. The annual address of the president, and the reports of the other officers, of the various committees and of the State Board of Pharmacy were read and appropriately disposed of. The draft of a law for the regulation of the sale of alcoholic liquors for medicinal purposes was submitted and referred to the Committee on Legislation.

Papers were read by Prof. Hayes on the "Therapeutic value of Electricity;" by A. G. Vogeler on "Citrine Ointment;" also, one entitled "Whither are we Drifting?"; by C. S. Hallberg on "Ergot," and several papers by H. Biroth.

The following officers were elected to serve for one year: President, Henry Biroth, Chicago. Vice-Presidents, I. H. Le Caron, Braidwood; E. Smallhausen, Lawrenceville; J. B. Boyd, Quincy. Permanent Secretary, T. H. Patterson, Chicago. Treasurer, W. P. Boyd, Arcola. Executive Committee—Thomas Whitfield, Chicago; L. Van Patten, St. Charles; Victor H. Dumbeck, Peoria.

After the transaction of routine business and electing Mr. H. Fleury Local Secretary, the Association adjourned to meet next year in Springfield, on the second Tuesday of October.

The meeting was well attended, various places of interest were visited, and a banquet at the Grand Pacific Hotel was provided for a large number of guests.

---

## EDITORIAL DEPARTMENT.

---

**CHARGES AGAINST PHARMACISTS.**—In our September number, page 474, we alluded to sensational attacks made by a newspaper of this city upon the integrity and trustworthiness of the pharmacists of Philadelphia, and stated that the Trade Association of Philadelphia Druggists had requested to be furnished with proofs of the charges made. This proof has at last been forthcoming and was submitted to a meeting held October 9th. From the report of the committee and the appended documents, it appears that Dr. Leffman had been engaged to analyze sixty-five medicines procured at different drug stores, the large majority being presumably those upon whom the suspicion of adulteration and substitution rested. In one case sulphate of cinchonidine had been substituted for sulphate of quinine, and in another case a mixture of borax and tannin had been dispensed as boracic acid. These are the only two cases of actual fraud that were clearly proven; for the dispensing of sulphate of eserine in place of hydrobromide of eserine was certainly not a fraud, though the manner in which the error or inaccuracy occurred has not been explained.

In addition to these cases, a great deal of capital was sought to be made by the newspaper from the analysis of several samples of tincture of opium, which appear to have been purchased as laudanum, and not to have been obtained upon prescriptions. The laudanum procured from a reliable wholesale house was taken as the standard of comparison; it yielded 4.6 grains of morphine to the ounce. The Pharmacopœia of 1870 requires dried



opium to contain 10 per cent. of morphine, and since a fluidounce of tincture of opium represents 37.5 grains of opium, it should contain 3.75 grains of morphine; the standard selected was therefore .85 grains = 22.7 per cent. stronger than the minimum strength permitted by the Pharmacopœia. It will thus be seen that those samples which were reported to have been 20 and 25 per cent. below the standard sample were fairly within the limits and intention of the Pharmacopœia. The same cannot be said for a few samples which were reported to have yielded 40 to 50 per cent. less morphine than the standard sample; but whether this was really fraudulent dilution has not been explained. It is well known that certain pharmacists always sell at retail laudanum diluted with one-half or an equal bulk of diluted alcohol, with the view of lessening the danger of serious mistakes on the part of the consumer. Years ago we have pointed out the error of this view, and the injustice thereby done to those pharmacists who not only in the dispensing of prescriptions, but also in the retail sales, adhere strictly to pharmacopœial strength; but our opposition to this practice does not prove its non-existence, nor lessen the good faith—mistaken though it may be—in which it is kept up by a few, and until the contrary has been shown we prefer to take this view of the laudanum cases, instead of regarding them as fraudulent sophistications.

The whole crusade dwindles down to two cases of fraud, surely a grand result of the continuous vituperation extending through several months, and this was announced by the newspaper in question, in large type headings, as "the charges substantially sustained," and "substitution fully proven." It is the intention of the Trade Association to prosecute the above cases of fraudulent substitution. But a result, which was not looked for is this, that after diligently searching for cases of substitution and adulteration such an insignificant number only could be found, in a city where it is estimated that daily about 4,000 prescriptions are dispensed; we think it should be a lesson to those who waste their time in accusations of unlimited frauds committed by pharmacists and druggists.

---

## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

---

*On Asthma; its Pathology and Treatment.* By Henry Hyde Salter, M.D., F.R.S., etc. First American, from the last English edition. New York: Wm. Wood & Co., 1882. 8vo, pp. 284.

Nearly two-thirds of the volume is taken up with the pathology, clinical history, ætiology, diagnosis, prognosis and treatment of the different forms of asthma; hygiene, diet and the various remedial agents are fully considered, but amongst the latter we have noticed the absence, at least from the index, of several remedies which have been used in this complaint with more or less success, such as amyl nitrite, eucalyptus, grindelia, jaborandi and others. The appendix gives a full history of fifteen selected cases, and in tabular form the history of 223 cases, nearly all of which had come under the author's personal observation, doubtless an addition of great value to the physician.

The volume is published as one of the current series of the Library of Standard Medical Authors.

---

*Nitroglycerine as a Remedy for Angina pectoris.* By Wm. Murrell, M.D., M.R.C.P., etc. Detroit: Geo. S. Davis, 1882. Small 8vo, pp. 78. Price, \$1.25.

After giving a brief chemical history of nitroglycerin, the author proceeds to describe its physiological action upon animals and man, and then relates his experience with it in the treatment of angina pectoris, in which disease it proved to be of decided service. The remedy is used in the form of the one per cent. alcoholic solution, which is preferable to the solution in ether, and is given diluted with water or peppermint water, sometimes in connection with a little spirit of chloroform. It may also be made into pills or tablets. The commencing dose of the solution is about one minim, but occasionally persons are affected by a much smaller dose, or require a larger quantity, the object being to get the physiological effect of the drug; after a time tolerance is established and larger doses are required. Alarming symptoms, resulting from an overdose, are commonly transitory, and the patient recovers before assistance can be obtained.

The little volume is gotten up in good style, with clear type, heavy toned paper, and cloth binding, embossed in gold.

---

*The Physician's Visiting List for 1883, for 25 Patients per Week.* Philadelphia: P. Blakiston, Son & Co. Price, \$1.

This is the thirty-second year of the publication of this visiting list.

---

*Handwörterbuch der Pharmacognosie des Pflanzenreichs.* Von Prof. Dr. G. C. Wittstein. Breslau: Eduard Trewendt, 1882.

Dictionary of Pharmacognosy of the Vegetable Kingdom.

The third part of this valuable work contains the articles in alphabetical order from Gurgunbalsam to Kornblume. The statements made of two North American drugs need slight corrections: *Kalmia latifolia* was found by Kennedy (1875) to contain arbutin, and gelsemine was isolated by Kollock in 1855; although physiological experiments have been made with this alkaloid we are not aware that it is therapeutically employed.

---

*Proceedings of the Third Annual Meeting of the Iowa State Pharmaceutical Association,* held in Des Moines, Tuesday and Wednesday, February 14 and 15, 1882. Iowa City. 8vo, pp. 178.

*Proceedings of the Pennsylvania Pharmaceutical Association at its Fifth Annual Meeting,* held in Altoona, June 13, 14, 1882. Harrisburg. 8vo, pp. 184. Price, 75 cents.

*Proceedings of the Fifth Annual Meeting of the Kentucky Pharmaceutical Association,* held in Covington, May 17 and 18, 1882. Louisville. 8vo, pp. 72.

The meetings of the above associations have been noticed on pages 204, 381 and 428 of our present volume. The Proceedings of the Iowa Association contains a good lithographic portrait of the second President, G. B.

Hogin, and through the printed minutes over a dozen of advertisements are scattered, appearing as parts of the minutes. The Proceedings of the Pennsylvania Association contains the proposed pharmacy law, as revised by the committee, in accordance with the suggestions made at the meeting.

---

*Essentials of Vaccination*; a Compilation of Facts relating to Vaccine Inoculation and its Influence in the Prevention of Small-pox. By W. A. Hardaway, M.D., Professor of Diseases of the Skin, in the Post-Graduate Faculty of the Missouri Medical College, at St. Louis, etc. Chicago: Jansen, McClurg & Co., 1882. 8vo, pp. 146. Price, \$1.

While this little volume does not profess to be a comprehensive treatise on vaccination, it will be nevertheless welcomed as embracing and sifting from the extended literature on the subject the main and important facts relating to its history and merits, which must lead every unbiased mind to acknowledging the blessing that vaccination has been to the human race, and towards persisting in the efforts of reforming such evils as may exist, and of extending the practical usefulness of the measure, so that in the course of time the noble dream of Jenner, the total extinction of small-pox, may be realized.

---

## OBITUARY.

---

FRIEDRICH WOEHLER.—On the 25th of September the Atlantic cable announced the demise of this veteran chemist at Goettingen, where he had resided for forty-six years, occupying for about forty years the chair of chemistry in the university of that city, and remaining in active connection with this institution to the time of his death.

Woehler was born at Eschersheim, near Frankfort-on-the-Main, July 31, 1800, was educated at Roedelheim and Frankfort, and studied medicine at Marburg and Heidelberg, receiving the title of M.D. at the latter university in 1823. But his favorite studies were mineralogy, physics and chemistry, notably the latter science which owes to his patient and accurate researches much of its present position. While a medical student, he commenced his investigations of the cyanogen compounds, and experimented upon the secretions, through the urine, of various compounds, the latter researches proving the conversion, in the animal economy, of citrates, tartrates and similar salts of the alkalies into alkaline carbonates. The diligent and observing student soon attracted the attention of Leopold Gmelin, his teacher in chemistry, in Heidelberg, who advised him to embrace chemistry as his profession in the place of medicine. Woehler acted promptly upon this advice, worked for a year under the guidance of Berzelius and accompanied the latter upon a tour of exploration through Norway and Sweden in the summer of 1824. In the following spring he received and accepted a call as professor of chemistry to the Polytechnic School of Berlin, and in 1832 to a similar institution at Cassel, from which place he removed to Goettingen in 1836.

Woehler executed a large number of analyses of minerals, and introduced many improvements in the analytical methods. He first isolated or improved the process of isolation of many elements, like potassium, yttrium, beryllium, aluminium, tungsten, titanium, boron, etc., and elaborated a number of processes for use in pharmacy, metallurgy and the arts. He showed the difference between infusible and fusible white precipitate, the composition being determined by Kane. He discovered the dimorphism and isomorphism of the oxides of antimony and arsenic, and showed that dimorphous bodies possess different melting points in the amorphous and crystalline condition. The first instance of isomerism (polymerism) was clearly proven through the discovery of cyanic acid by Woehler in 1822, and of fulminic acid by Liebig and Gay-Lussac in 1824.

Woehler's labors in organic chemistry were not less extended and fruitful for theory as well as practice. His preparation of urea from cyanic acid and ammonia in 1828, opened the way for the production of organic compounds from inorganic material. But perhaps still greater results flowed from his labors undertaken conjointly with Liebig, who was then professor at the University of Giessen. The brightest of these researches were made during the decade 1830 to 1840, and embraced the compounds and derivatives of benzoyl, cyanogen and uric acid. Aside from the large number of new compounds discovered by the colaborers, facts like the chemical relation of oil of bitter almond to benzoic acid, the glucoside nature of amygdalin (1837), the substitution of hydrogen by chlorine and other elements, and many others opened new fields of investigation and new views, upon which could be gradually built the theoretical structure of chemistry of the present time.

The literary productions of Woehler are very numerous; his essays were published in the prominent journals of chemistry, physiology and physics of Germany, in the Transactions of the Academies of Stockholm and of Goettingen, and particularly in the "*Annalen der Chemie und Pharmacie*" (now "*Liebig's Annalen*") of which he was for many years one of the editors. He also wrote for the first edition of the "*Handwörterbuch der Chemie*" many of the most important articles, and from 1825 translated into German the handbook of chemistry and the annual report on the progress of chemistry by Berzelius, and other works written in the Swedish language. His little "*Grundriss der Chemie*" (*Outlines of Chemistry*) proved to be of such excellence that it passed through many editions and was translated into three or four languages. The inorganic part made its first appearance in 1831, and the organic part in 1840, and it is still in existence, though of course in a greatly modified form, being at present edited by Prof. Fittig.

As a teacher, Woehler was revered by his pupils, among whom was a large number from this side of the Atlantic; as a man he was above reproach, and as a scientist he was honored everywhere. The American Pharmaceutical Association, the Philadelphia College of Pharmacy, and other American societies lose in him one of their most valued honorary members. He survived his somewhat younger colaborer, Liebig, nearly nine and a half years.